TECHNOLOGY DEPT.

Telephone ENGINEER and MANAGEMENT

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Featuring

SPRING CONSTRUCTION AND MAINTENANCE

•

THE COVER PICTURE

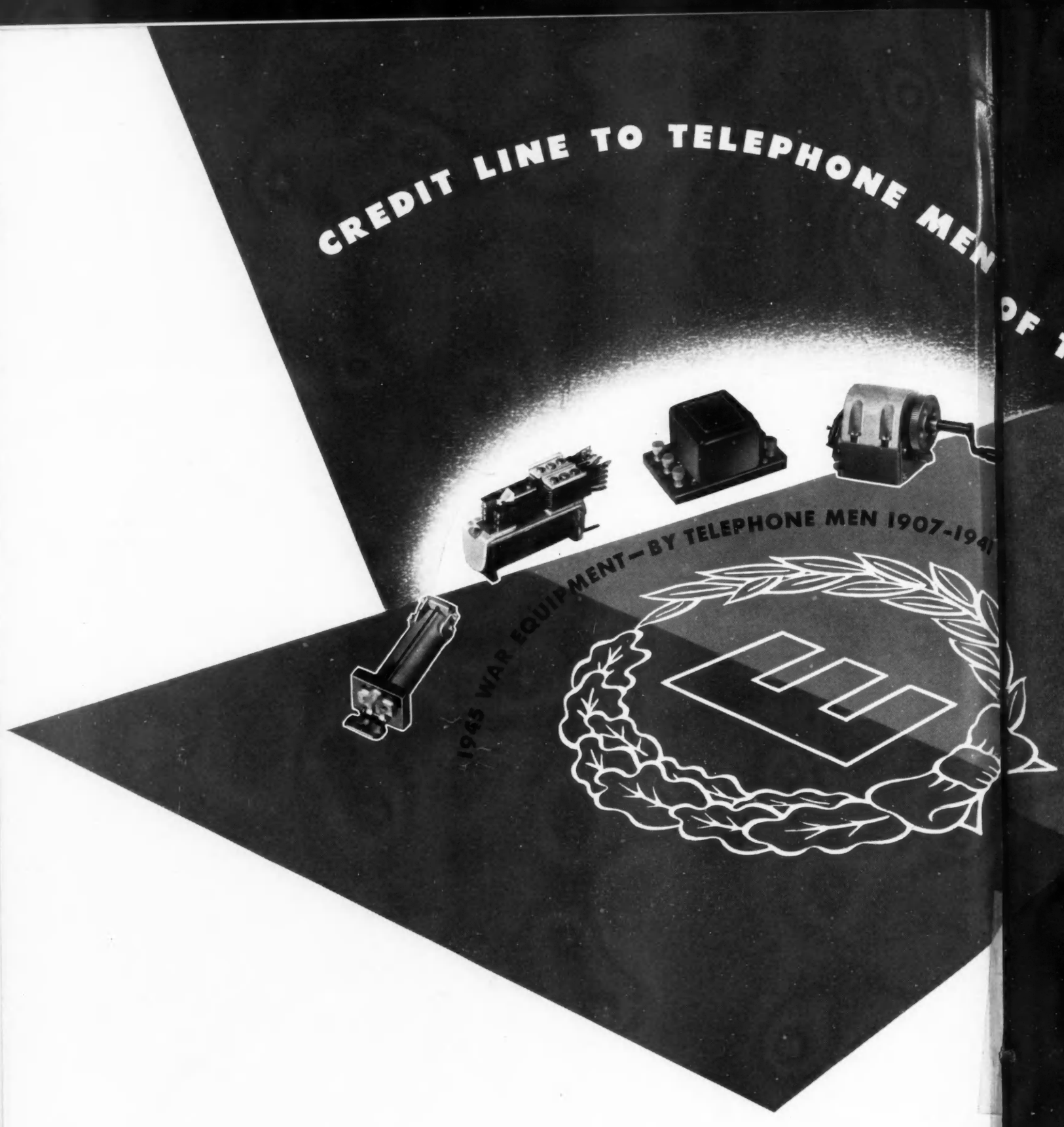
Springtime construction on a South Pacific island by American Signalmen. A class A cross-arm is being fastened to a newly set pole in the construction of a 15 mile pole line. [Signal Corps Photo]

"Teach Men the Art of Climbing," a fully illustrated article with tips on how to obtain an easy, safe, efficient climbing technique, is on page 38 of this issue.

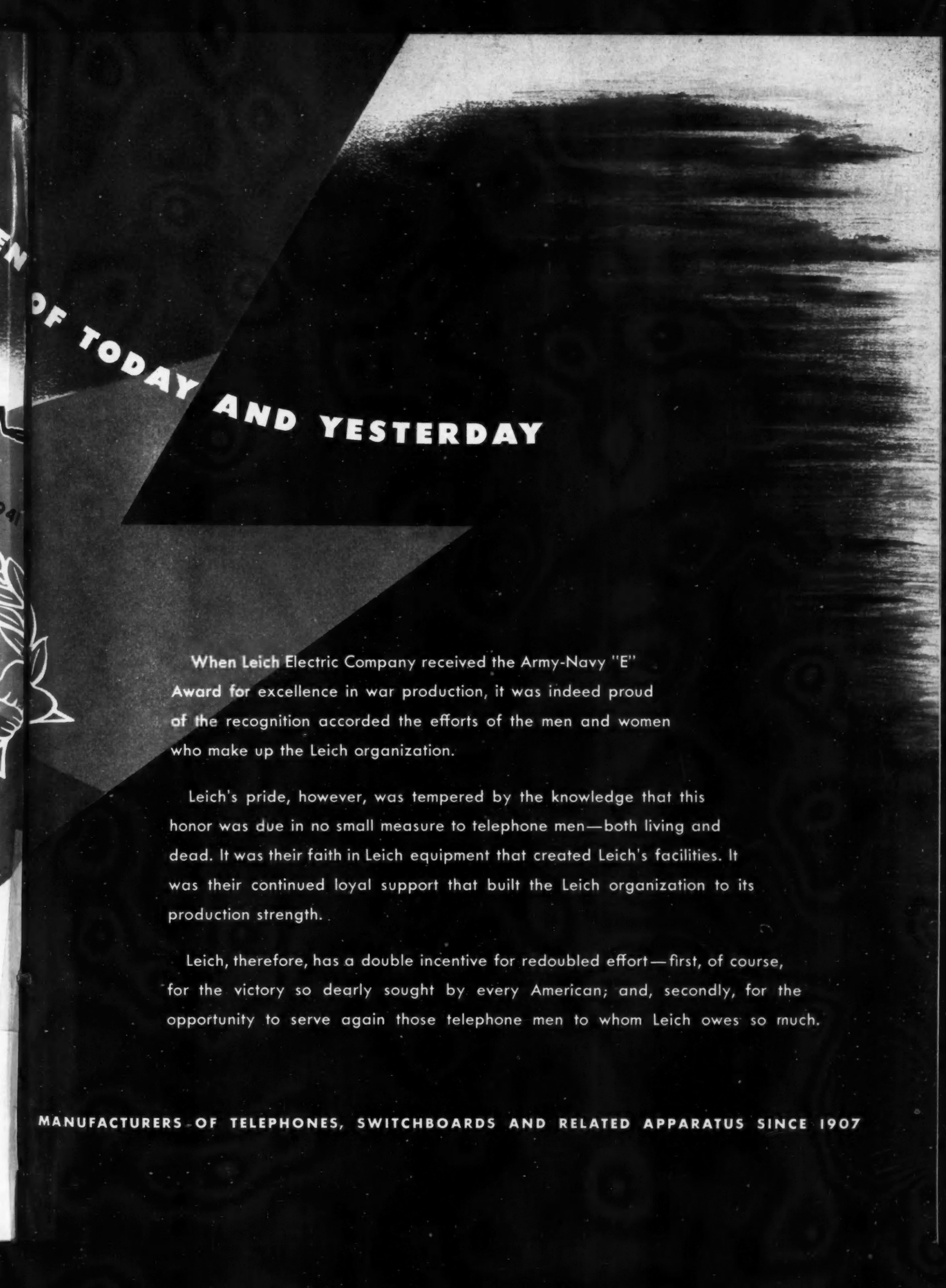
•

VOLUME 49, NUMBER 4. Published monthly by Telephone Engineer Publishing Corporation. Office of Publication Benton Harbor, Illinois. Executive and Editorial Office, 7820 Sheridan Road, Chicago (Illinois). Subscription rates: U. S., Cuba, Mexico, $1.50 per year; Canada $2.00; in all other countries, $3.50. Single copies, U.S.A., 15 cents. Entered as second class matter at the post office at Benton Harbor, Illinois, under the act of March 3, 1879.

THE MAGAZINE OF THE TELEPHONE INDUSTRY


CREDIT LINE TO TELEPHONE MEN
1943 WAR EQUIPMENT—BY TELEPHONE MEN 1907-1941

LEICH



OF TODAY AND YESTERDAY

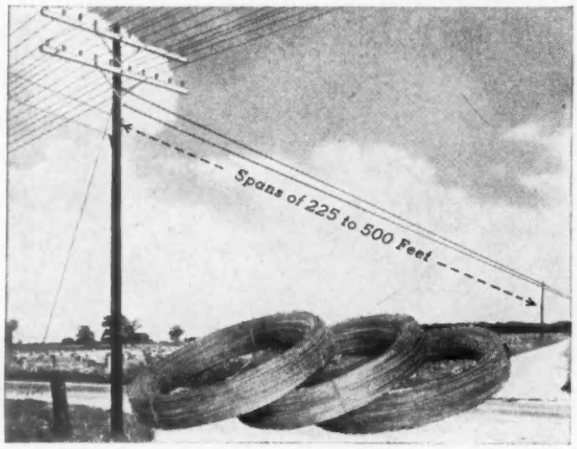
When Leich Electric Company received the Army-Navy "E" Award for excellence in war production, it was indeed proud of the recognition accorded the efforts of the men and women who make up the Leich organization.

Leich's pride, however, was tempered by the knowledge that this honor was due in no small measure to telephone men—both living and dead. It was their faith in Leich equipment that created Leich's facilities. It was their continued loyal support that built the Leich organization to its production strength.

Leich, therefore, has a double incentive for redoubled effort—first, of course, for the victory so dearly sought by every American; and, secondly, for the opportunity to serve again those telephone men to whom Leich owes so much.

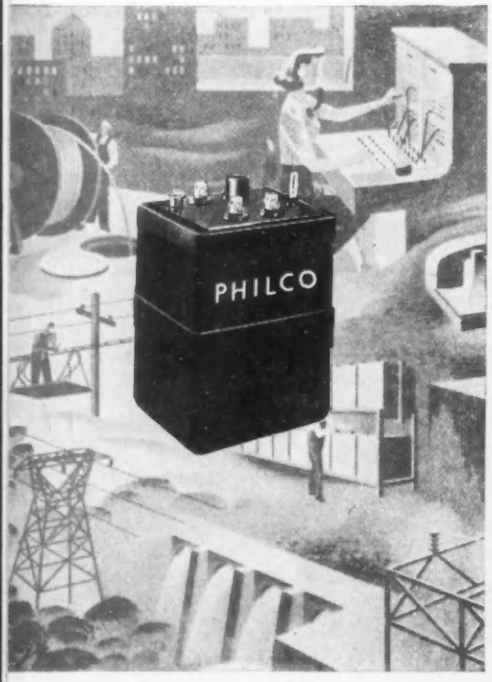
MANUFACTURERS OF TELEPHONES, SWITCHBOARDS AND RELATED APPARATUS SINCE 1907

Honorably Discharged. Although most KELLOGG Signal Bronze Drop Wire with its armored insulation is still "in the army," some limited supplies will soon be available to telephone companies. Its strength, conductivity, and longevity make it the ideal drop wire under today's conditions.

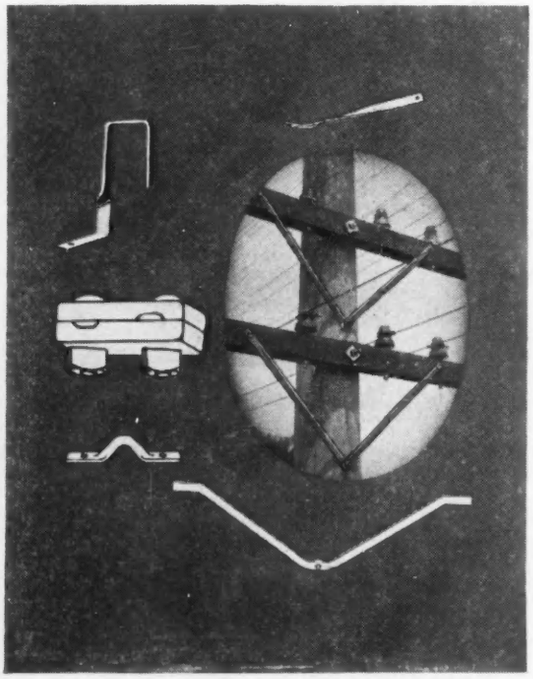


Save Two Ways on line wire replacement or new construction by making INDIANA STEEL & WIRE CO.'s Crapo HTL-85 and Crapo HTL-135 Line Wire your standard. You'll save on construction costs and maintenance expense. These wires are galvanized by the famous Crapo Process.

Durable and Quiet. The quiet Sub-Cycle Master Ringing Converter changes frequency *without moving parts* because it is a static-type converter. Made by LORAIN PRODUCTS CORP., it gives dependable, trouble-free, powerful ringing current without wear, adjustment, or maintenance. Provides ample power with close output regulation between no load and full load.

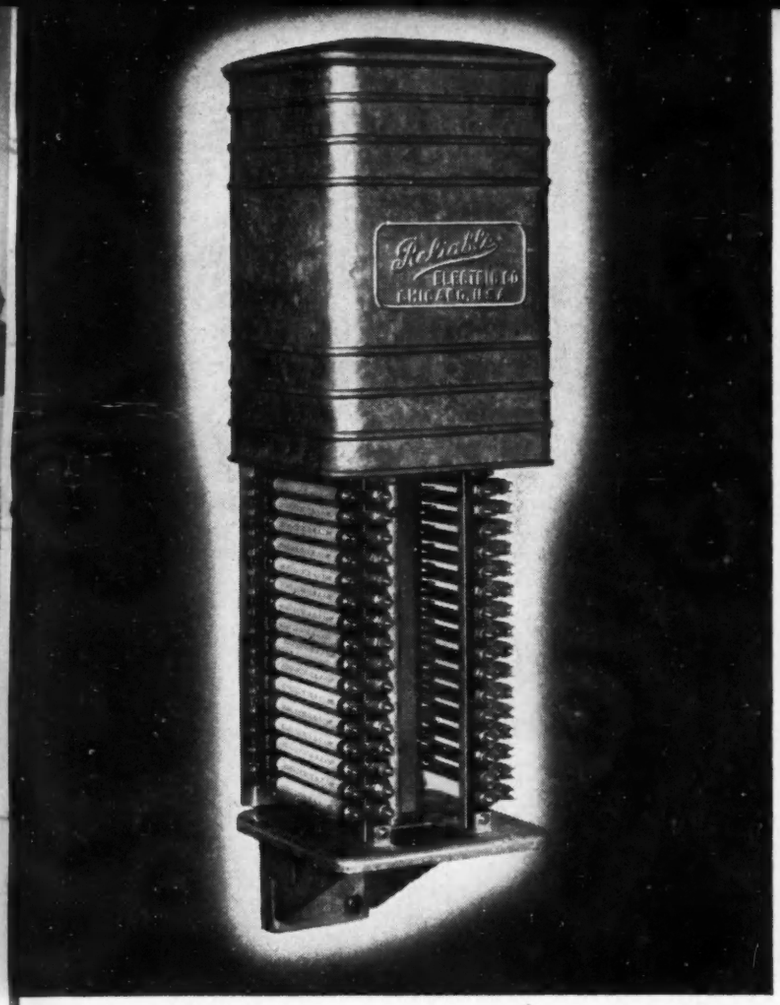


The Modern Engineering Features You Need for today's full float service are built into PHILCO Telephone Batteries. Both the design and metal used in Philco Floté grids represent a marked advance resulting in higher electrical efficiency, elimination of low cells, and longer service life.



Less Work and Worry are connected with line maintenance when Joslyn Hardware carries telephone lines. Each item in JOSLYN MANUFACTURING & SUPPLY COMPANY's line is ruggedly built for utmost durability, and specially treated to resist every weather extreme. Prompt service and delivery assured.

They Dig in and Hold! The sharp blades of A. B. CHANCE CO. Steel Expanding Anchors *dig in* to clay, loam, sand, or hardpan with a minimum of earth disturbance, and *hold* without breaking or bending. Obtainable in diameter sizes from 6" to 12", for two to four-way expansion.



Linemen Know the Difference! With the B27 Cable Terminal, all drop connections are made in front! Equipped with Sawtooth Discharge Blocks, this RELIABLE ELECTRIC COMPANY product dispels static discharges without time lag or grounding of the line. Possibility of high resistance ground is reduced because the ground connection is made directly to the ground strip.

The Famous "Dutch Boy" on National Bar Solder is your assurance that you are getting top quality solder for every soldering job. Made by NATIONAL LEAD COMPANY, this bar solder is made to the most rigid specifications, and is guaranteed to be made only from pure, clean metals. You can purchase dependable National Bar Solder in virtually any form or composition.

KELLOGG Recommends and Guarantees These Finer Supplies

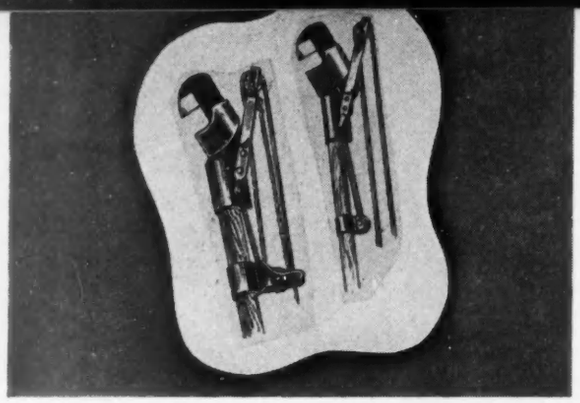
. . . and that is your assurance that the line supply and construction materials shown here—all products of leading manufacturers—can be relied on for dependable service and lasting satisfaction. Like all line supplies listed and described in the Kellogg catalog, they are backed by the famous Kellogg "double guarantee." This is your best assurance of getting materials that will perform properly over a long period of time. Send your orders to . . .

KELLOGG SWITCHBOARD & SUPPLY COMPANY

Factory and General Offices: 6650 South Cicero Avenue, Chicago 38, Illinois

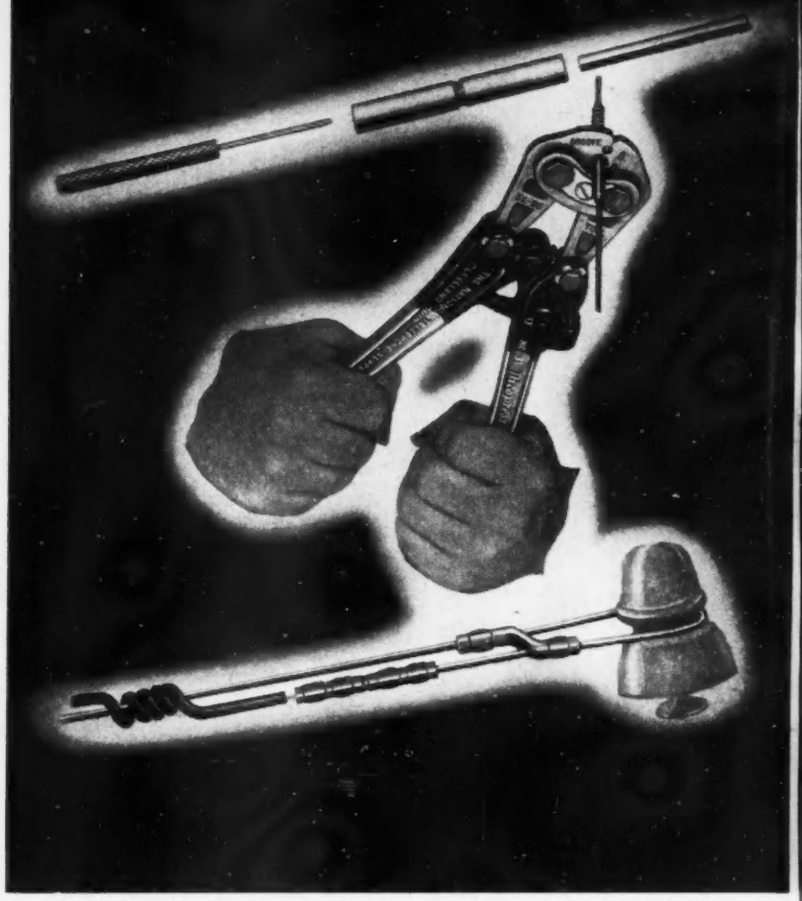
Branch Offices: Kansas City San Francisco St. Paul Los Angeles

Order Your Line Supplies from KELLOGG



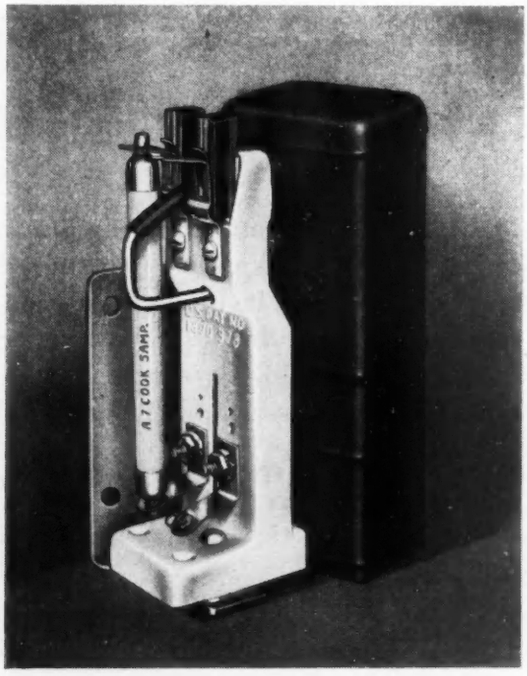
Fast, Easy Cutting is assured with Newman Tree Trimmers. The knife cuts downward, spreads cut behind it, prevents wedging or choking. Heavy Duty Model at left cuts 1½" limbs—Feather Weight model at right 1" limbs—easily and quickly. NEWMAN MANUFACTURING & SALES CO.

Fits Telephone Needs to a "T". Ray-O-Vac Telephone Dry Batteries are built to resist deterioration when not in use. Their internal protective coating, developed by RAY-O-VAC COMPANY, extends their life, whether used or not. The result: fewer battery replacements and lower costs.

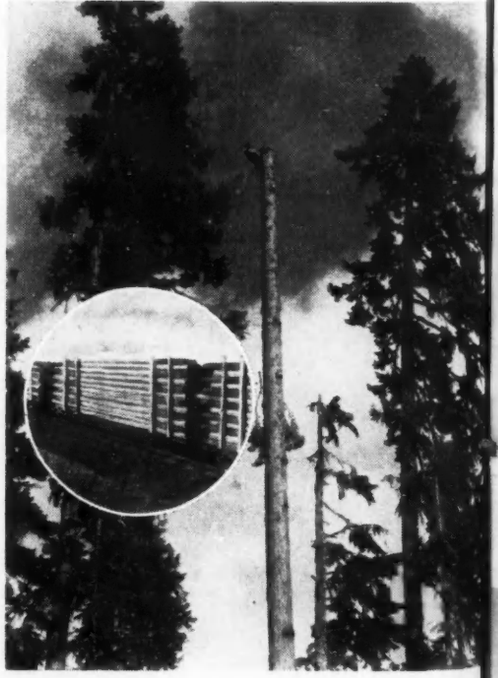


Simpler Splicing of two wires of different size is accomplished with Nicopress Reducing Sleeves. Made by NATIONAL TELEPHONE SUPPLY CO., they are part of the famous Nicopress Compression Splicing Method. Splices are easily made on poles or on the ground with the Nicopress Tool. They exceed the breaking strength of the conductors, and have a lasting high conductivity.

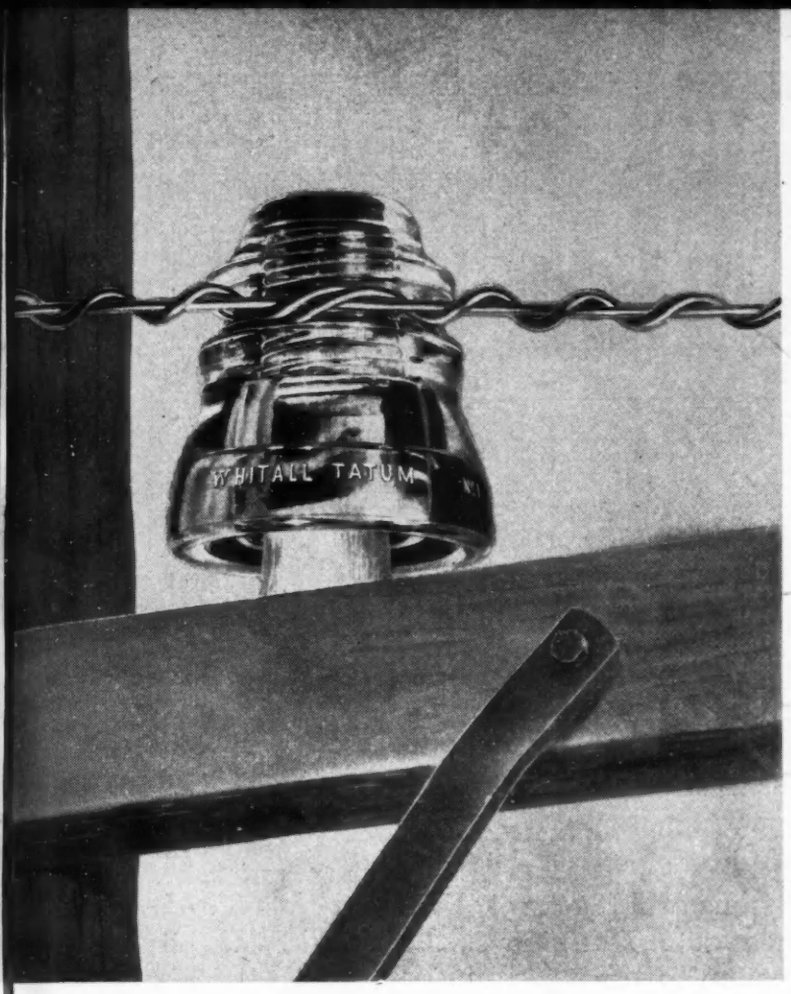
avorite Places to Phone for many folks are Churchill Folding Door Booths. Made by CHURCHILL CABINET COMPANY, they provide both privacy and comfort. The No. 100 Booth has automatic door switch for lights and ventilator, correct acoustical design, and longer life.



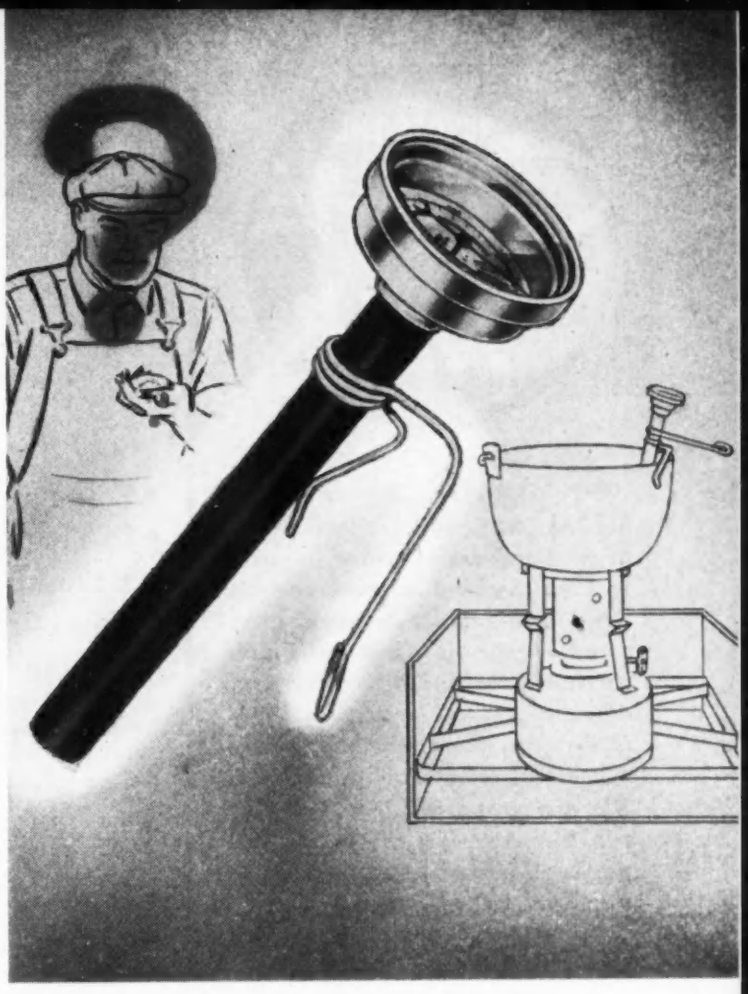
Built to "Take It!" The Cook Type "O" Sub-Station Protector, with one pair of fuses and one pair of high potential dischargers is ideal, both for indoor as well as outdoor use. Made by COOK ELECTRIC CO., its body is a single piece of white glazed low-absorbent porcelain, designed to prevent surface leakage.



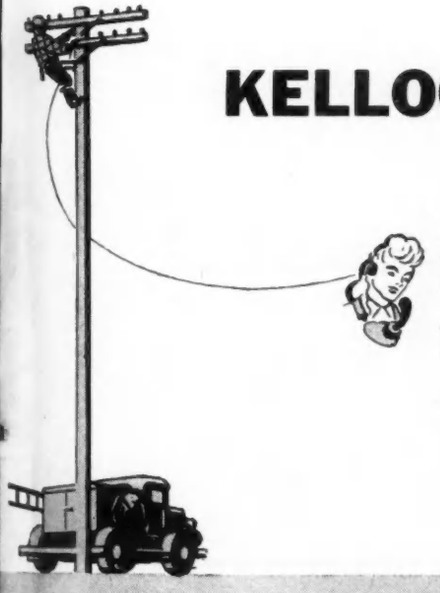
Topping a "Spar" Tree is one of the spectacular operations involved in logging selected trees to become MAC GILLIS & GIBBS CO.'s straight, sturdy cedar poles. Recommended by Kellogg, these reliable poles are nationally famous for their durability, strength, and longer service life.



Meet Every Service Need. No matter what your requirement, there is a size and style of Armstrong's Whitall Tatum Insulator to meet it. Made by ARMSTRONG CORK COMPANY, they feature crystal clarity of glass, accurate gaging, and unusual resistance to temperature changes. For reducing your maintenance expenses, Armstrong's Whitall Tatum Insulators are a good bet.



Guesswork is Out when you use the Dillon Temperometer. It registers correct temperatures of cable damming and impregnation waxes, paraffin, compounds and wiping solder. These materials must be heated to correct specific temperatures to get best results. Thousands of these light-weight, rugged W. C. DILLON AND COMPANY, INCORPORATED instruments are in use today.



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Order Your Line Supplies from KELLOGG

ACROSS THE Editor's Desk

"Teaching the Art of Climbing" might be old hat with many of our readers; but when the subject is presented in pictures as is done in this issue, we wager even some of you old timers will pick up ideas. Climbing safely and efficiently should come easily if those practicing the art, study this illustrated article carefully. We are preparing a number of reprints carrying the entire five pages which will be available to our readers.

▼

To issue our Spring Construction & Maintenance Number entailed much planning and preparation. The contents speak for themselves. We of the staff feel it is one of our best efforts to date. It is a bit difficult, however, for us always to know just what you want. If our efforts are of value to you, fine; if not, we would surely appreciate your comments on this issue and suggestions for future numbers.

▼

Our Radio Course for Telephone Men is off to a flying start. Completion of Chapter 1 with questions and instructions for mailing your answers is in this issue. Each succeeding issue will carry this FREE course to our readers.

R.W.S.

TELEPHONE ENGINEER AND MANAGEMENT

Vol. 49, No. 4 **APRIL, 1945**

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Published Monthly by
Telephone Engineer Publishing Corporation

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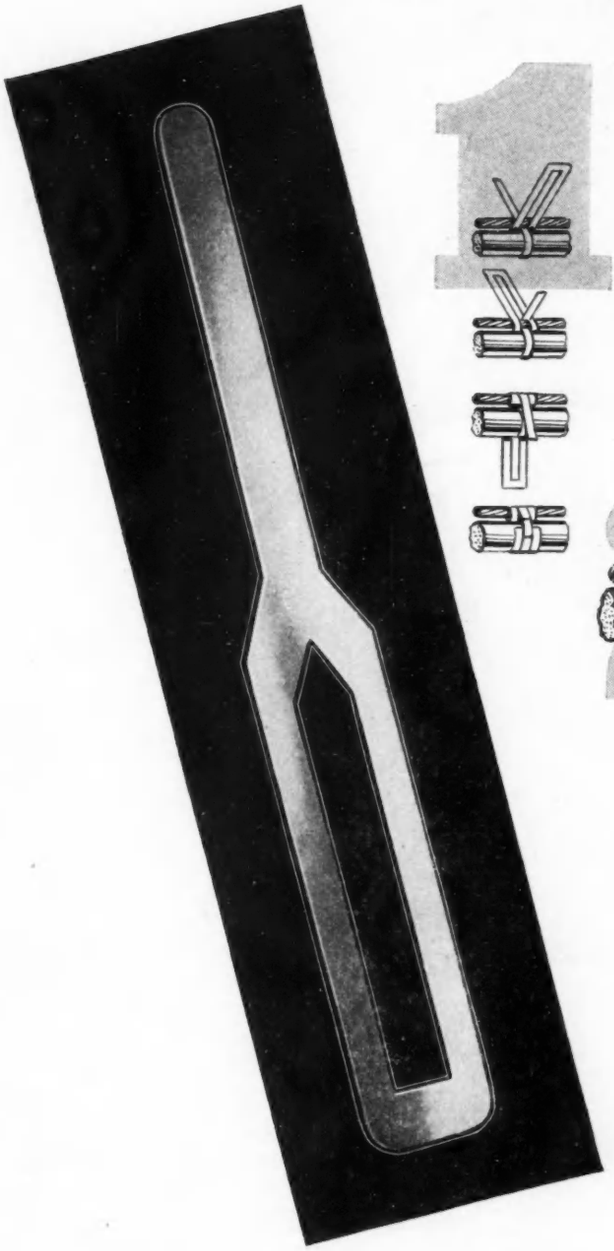
SERVING THE SIX BILLION DOLLAR TELEPHONE INDUSTRY

Founded in 1909

Office of Publication, Pontiac, Illinois. Executive and Editorial Offices 7720 Sheridan Road, Chicago 26, Illinois. Phone Rogers Park 3040. RAY W. SMITH, Editor; ROY F. SMITH, Adv. Manager, DON C. SORENSEN, Sales Prom. Mgr. Subscriptions: U. S., Cuba, Mexico $1.50 Per Year; Canada, $2.00; In all Other Countries, $3.50. Single copies, U.S.A., 15 cents. Single copy JANUARY 15 BLUE BOOK BUYER'S GUIDE, $1.00. All subscriptions should be sent DIRECT to 7720 Sheridan Rd., Chicago, 26, Illinois.

Reliable *because...*

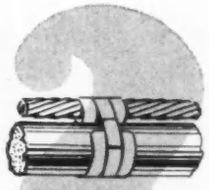
extensive laboratory tests and years of field experience have definitely proved the Reliable Zinc Cable Hanger. For hanging new cables or for prolonging the life of worn cables, these hangers are outstanding. Build for the future by specifying Reliable Telephone Equipment.



1

Reliable Zinc Cable Hangers are strong, economical and easy to install. They drastically reduce aerial cable maintenance costs.

2



All cable movement that results in wear and sheath cutting is eliminated. Added protection against lightning is provided with cable bonded solidly to the messenger.

3 LONG LIFE

Altho the cost of installing Reliable Cable Hangers is slightly higher than other methods, their use is more than justified since they are trouble-free for the life of the cable. No other cable hanging equipment can approach the service record of these hangers.

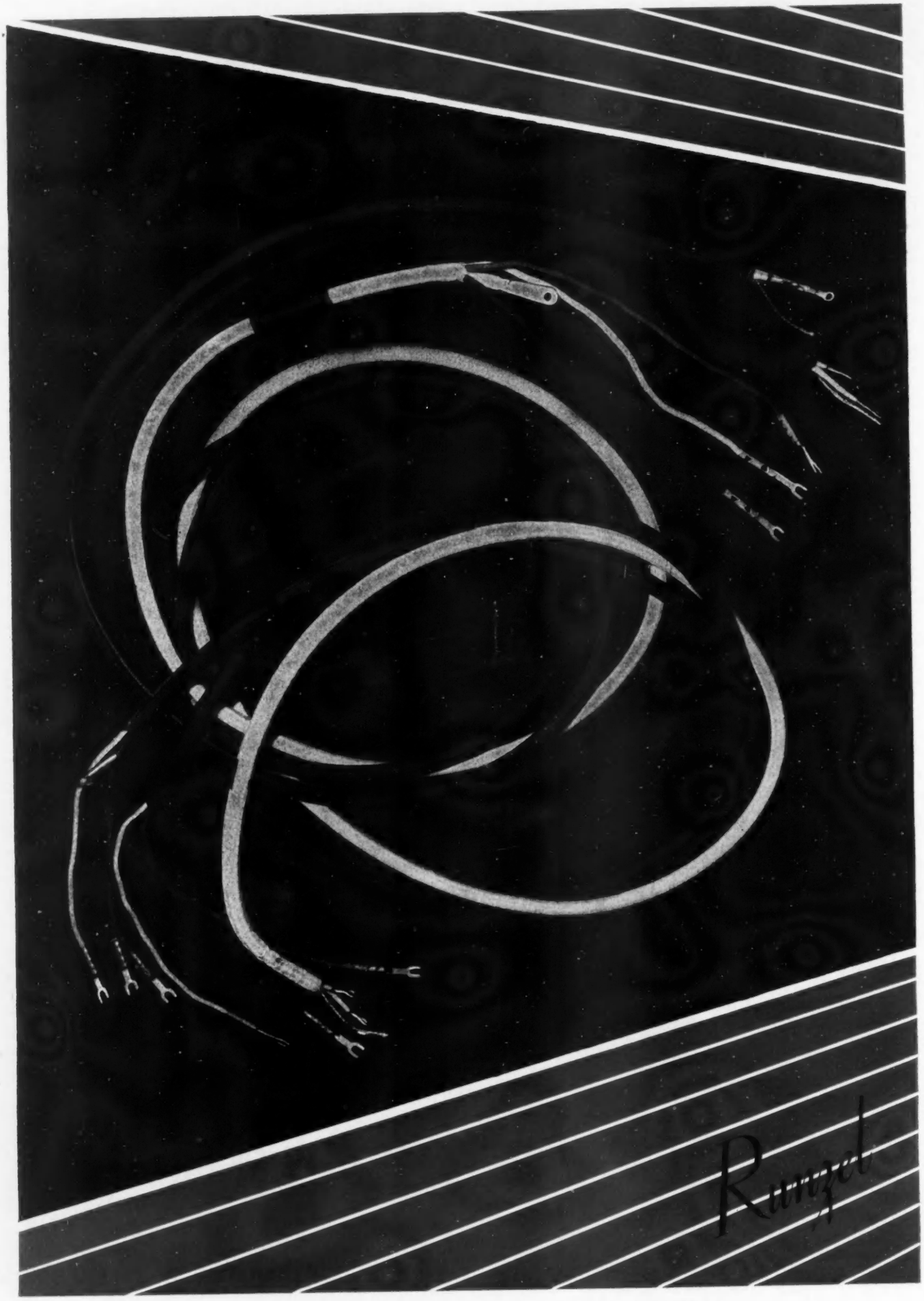
4 ZINC OR COPPER

Zinc hangers for use on galvanized strand are standard. Also available in copper for use with copperweld strand when WPB regulations permit.

RELIABLE ELECTRIC COMPANY

3145 Carroll Avenue, Chicago 12, Illinois

OVER 35 YEARS' SERVICE TO THE TELEPHONE INDUSTRY


Runzel

Velvet Smooth

PERFORMANCE

FROM

Runzel QUALITY CORDS

For the
Exacting Requirements
of the
TELEPHONE INDUSTRY

RUNZEL CORD & WIRE CO.
4723-31 MONTROSE AVENUE • CHICAGO 41

"No Experience Necessary"

That's a phrase we're borrowing from the "Help Wanted" columns, for it certainly applies to Bethlehem's new serving tool . . . a tool so easy to use that any lineman can learn to handle it in a few minutes' time.

As the illustration shows, the device makes possible a neat, tremendously strong serve by means of the dead-end coil method. Using a 10-foot coil of 11-gage bethanized dead-end wire, the lineman hooks one end in place on the strand; then, engaging the wire between the fingers of the serving tool, he wraps it solidly in place with a simple rotary motion. Exhaustive tests have proved conclusively that the serve holds beyond the useful strength of the strand.

After a little practice, the lineman can make his serve in about the time required to attach conventional clamps. Besides, this serve is considerably more economical than the clamp method, for a coil of the necessary wire costs less than even a single inexpensive clamp.

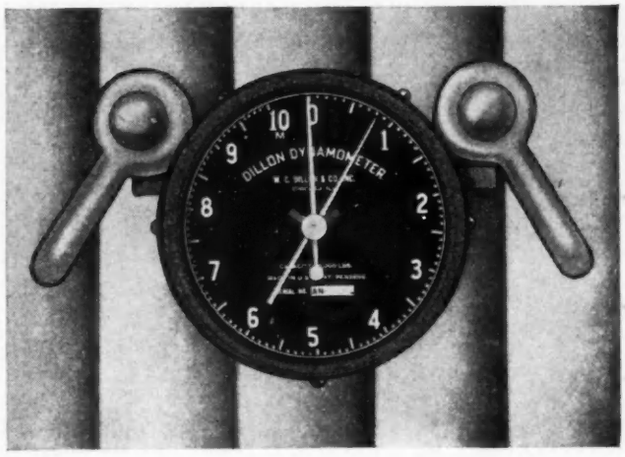
The serving-tool technique is especially recommended for use with *bethanized* strand and wire—manufactured by Bethlehem Steel Company. One reason is that the highly ductile, uniform bethanized coating (almost 100 per cent pure zinc, applied electrolytically) is not displaced to any harmful extent by the operation of the serving tool. Moreover, when bethanized strand and dead-end wire are used, there is no question about the holding power of the serve.

Write for more details—or, better still, ask the nearest Bethlehem representative to explain this simple, effective technique.

★ ★ BETHLEHEM STEEL ★ ★

CUT CONSTRUCTION COSTS!

Accurate DILLON TOOLS make the job faster, easier and less costly



The DILLON DYNAMOMETER:

Indicates EXACT tension in guy strand, messenger, and wire. Dead accurate, easy to use. Eliminates laborious guess-work of "sight and sag" or "oscillation" wire stringing. Thousands in use. Hooks onto wire in a jiffy, indicates tension in matter of seconds. SPECIFICATIONS: Compact, measures only 8¼" x 6¼" x 3", weighs 8 lbs. 4 oz. Rugged—built to last a lifetime. PRICE & DELIVERY: Various capacities up to 20,000 lbs. all LOW in cost. Present delivery running from 10 to 14 days.

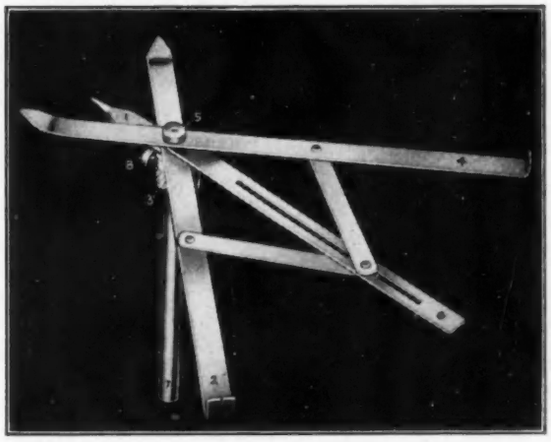
The DILLON BISECTOR:

A highly useful tool for locating correct position at which to sink anchor holes. Eliminates costly surveying operations and proves its value on hills, curves, etc. Designed on a scientific principle, locates anchor position in a few seconds correct to the inch.

SPECIFICATIONS: 12½" long. Folds up compactly only ⅞" wide.

Weighs 12 oz. Heavily plated.

PRICE & DELIVERY: $4.00 each F.O.B. Chicago. From Stock.



The DILLON TEMPEROMETER:

Designed for use in molten wiping solders, hot waxes and paraffine, etc. Will pay for itself many times over in savings made through elimination of costly and fragile glass thermometers. Assures perfect joints every time. Nothing to wear out, made to last indefinitely. Many thousands in use. One of the handiest tools in any kit.

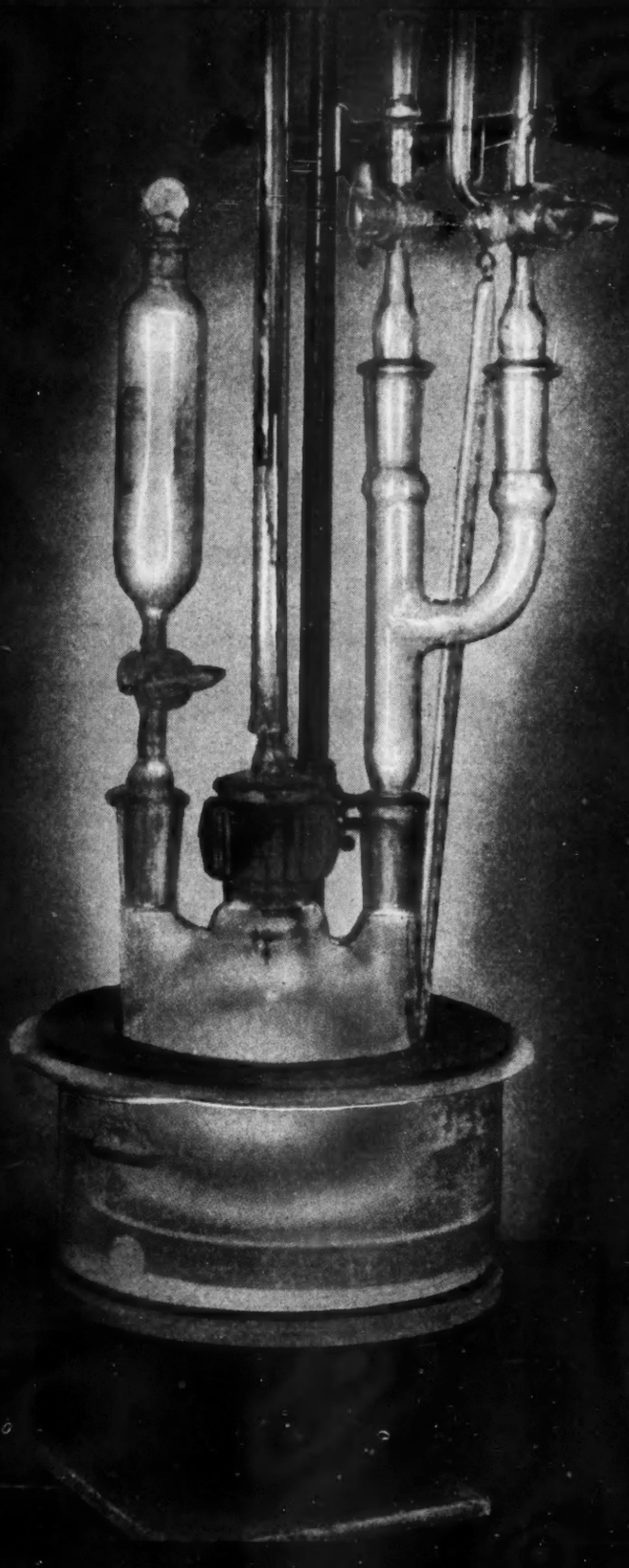
SPECIFICATIONS: 9" long. Tube ¾" diameter. Dial 2⅛". Weighs only few ounces. Easy to read numerals.

PRICE & DELIVERY: $6.00 each F.O.B. Chicago. From Stock.

Order from your favorite jobber---or from

W. C. DILLON & COMPANY, INC. 5410 WEST HARRISON STREET CHICAGO 44, ILLINOIS

TO RESIST



Electronic bombardment of high voltage cable oil under vacuum at 10,000 volts, a test as unique as it is purposeful, is but one indication of the searching investigations here undertaken.

VOLTAGE . . .

Here, wire and cable Research tests every component beyond the severest demands of service-in-the-field.

Looking far beyond today's needs, General Cable Research is prepared for the days when there will be commercial application of voltages beyond those of yesterday and today. Research endeavor is exploring in many directions, examining many products, evaluating the stability of many materials under the severest conceivable conditions. When the demand can be met, General Cable high voltage wires and cables will be available.

GENERAL CABLE CORPORATION

Manufacturers of Bare and Insulated Wires and Cables for Every Electrical Purpose

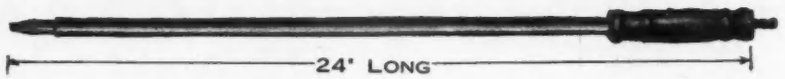
General Cable Products for the Telephone Industry are Distributed by

AUTOMATIC ELECTRIC SALES CORPORATION • Chicago, U. S. A.

Vulcan Soldering Tools

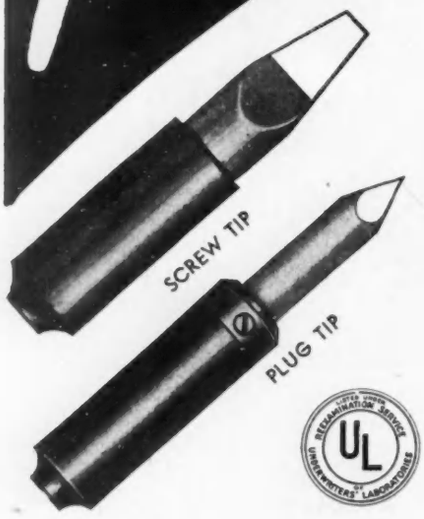
SATISFYING Telephone Men for Thirty Years

FOR RESOLDERING CONNECTIONS IN MULTIPLE SWITCHBOARDS



VULCAN ELECTRIC SOLDERING TOOLS

are in demand wherever HIGH QUALITY workmanship is desired . . . Designed for easy handling and fast soldering . . . VULCAN'S complete range in sizes of soldering tools assures maximum work at lowest current cost . . .



In addition to 14 standard sizes of Screw Tip and Plug Tip type of electric soldering tools. VULCAN makes special tools to fit any job.

Unusual VULCAN Features

Protected windings, hermetically sealed, prevent damage by flux fumes oxidation, water, etc.

Furest hard forged copper tips, tinned ready for use and easily replaceable. Meet every test of the new war solders.

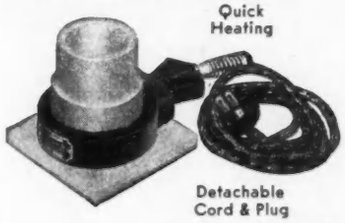
Ventilated handles, cool and comfortably shaped to fit the hand.

Fireproof, protected terminals relieve cord strain.

Current consumption very low. Less costly to operate.

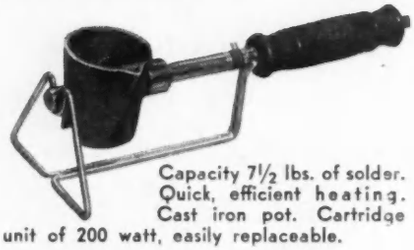
Catalog No. 35—Plug Tip construction 3/8" tip, Rated 100 watts, Soldering Iron is ideal for telephone work.

Electric Soldering Pots



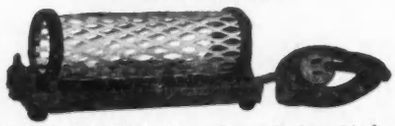
High Speed and Standard. Cast in one piece to a square base of heat resisting material. Flat type element is easy to replace. A dependable pot.

Solder Pouring Ladle



Capacity 7½ lbs. of solder. Quick, efficient heating. Cast iron pot. Cartridge unit of 200 watt, easily replaceable.

TOOLHOLDER



The TOOLHOLDER holds and guards the soldering tool when not in use. Rubber feet are provided so that it will not scratch or mar a highly polished surface. With or without thermostatic control.

RHEOSTATS provide more flexible and accurate temperature control of electric soldering tools and protect them, when not actually delivering their working heat by preventing the unused heat from storing up. Protecting the "tinning" from burning off the tip thus prolonging the life of the heating element in the tool.

"THE VULCAN GUARANTY"

The ***VULCAN*** Tools represent absolute quality, are accurately manufactured and tested, and are guaranteed perfect in both materials and workmanship. We specify no period of free replacement nor do we set a one year limit on our guaranty, but we will make good any VULCAN Tool in which our investigation shows any manufacturing fault.

"HOW TO SOLDER PERFECTLY"

A booklet every telephone man should have. May we send you a copy with our compliments?

Vulcan Electric Company,
Danvers, Massachusetts

Yes!—I would like to have one of your booklets.

Name

Company

City & State

TRADE VULCAN MARK

VULCAN ELECTRIC CO.

DANVERS, MASSACHUSETTS

"... and she always wanted a big wedding"

JOE had just finished talking to "the girl back home." She was to leave that night, would arrive next morning, and they were to be married at once. He just had to tell the news to someone, and who would be more understanding than the operator who had put through his call. When he said, "... and she always wanted a big wedding," he struck a responsive chord ... and an idea was born.

The operator passed the news along to her fellow workers. And when Joe and his girl arrived at the parsonage the following day, a delegation was there to greet them. "Just so the chapel wouldn't seem empty," the operator explained. Helping newlyweds off to a happy start, is but one of many self-imposed tasks performed by telephone workers at every army and navy post. They are observing, to the letter, the telephone tradition of faithfulness and dependability.

In Exide Batteries you will find the same dependability for which telephone service is famous throughout the world. Since 1895, Exides have been proving themselves worthy of that trust.

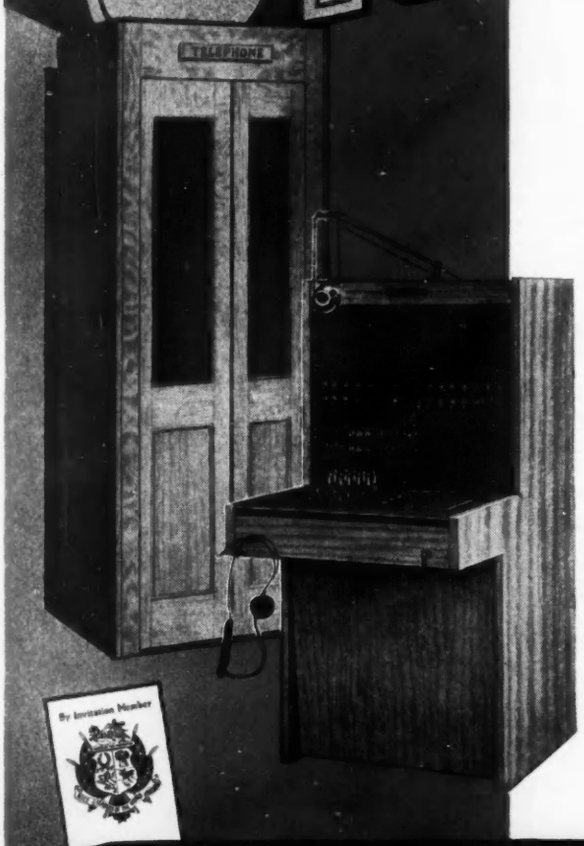
ARMY E NAVY

Exide
TELEPHONE BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32
Exide Batteries of Canada, Limited, Toronto

A NAME *You Know*

CHURCHILL



MANUFACTURERS OF FINE QUALITY TELEPHONE BOOTHS

For over forty years, CHURCHILL Cabinet Company has been one of the leading manufacturers of Wood Products for the telephone industry. Known from the very beginning for its quality, CHURCHILL Woodwork is the workmanship of craftsmen using the best of materials under ideal conditions.

Today, most CHURCHILL Communication Woodwork is going into the war effort and it can be found on fighting fronts all over the world winning the same praise in battle service that it earned in peacetime.

Tomorrow, when military demands permit, CHURCHILL Products will still be built to the highest standards of quality and craftsmanship that have always characterized CHURCHILL-built products.

Churchill Booths Are Distributed By:

AUTOMATIC ELECTRIC SALES CORP. • KELLOGG SWITCHBOARD AND SUPPLY CO. • STROMBERG-CARLSON CO. • J. H. BUNNELL AND CO. • LEICH SALES CORP.

CHURCHILL CABINET COMPANY
2119 CHURCHILL STREET · CHICAGO 47, ILLINOIS

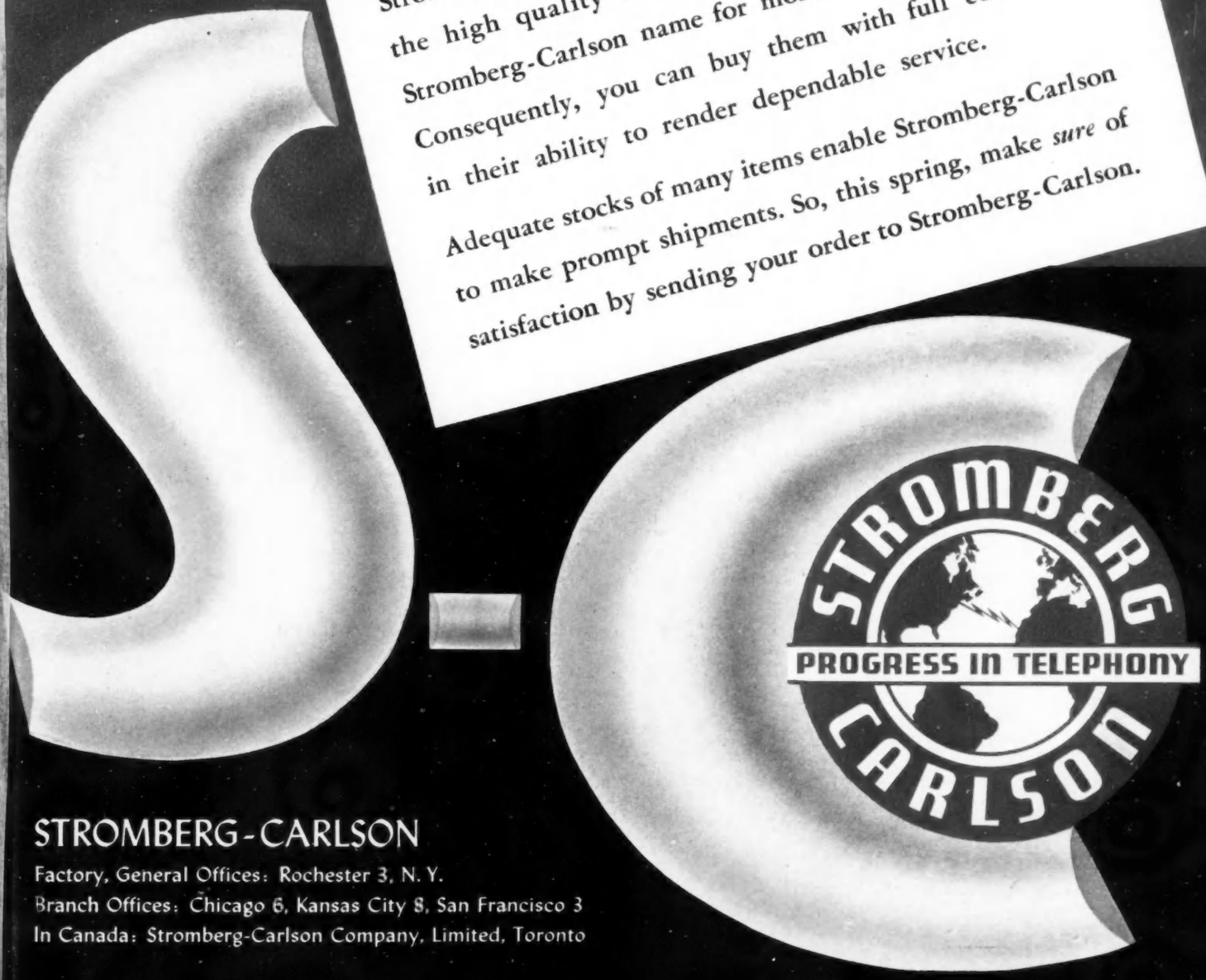
BUY WAR BONDS

This Spring

BUY *TESTED* CONSTRUCTION MATERIALS AND SUPPLIES FROM STROMBERG-CARLSON

Construction materials and supplies distributed by Stromberg-Carlson are tested to make sure they are of the high quality that has been associated with the Stromberg-Carlson name for more than a half century. Consequently, you can buy them with full confidence in their ability to render dependable service.

Adequate stocks of many items enable Stromberg-Carlson to make prompt shipments. So, this spring, make *sure* of satisfaction by sending your order to Stromberg-Carlson.



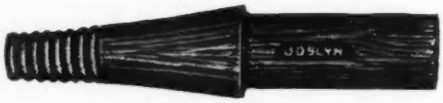
STROMBERG-CARLSON

Factory, General Offices: Rochester 3, N. Y.
Branch Offices: Chicago 6, Kansas City 8, San Francisco 3
In Canada: Stromberg-Carlson Company, Limited, Toronto

66 SUPPLY DEPOTS SERVE STROMBERG-CARLSON CUSTOMERS

CARRIAGE BOLT

FIR CROSS ARMS



1¼ x 8" WOOD PINS

WESTERN-UNION 2 x 2⅜ x 12" OAK BRACKETS

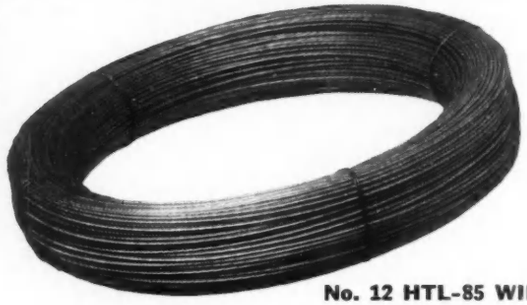
DUO-SAFETY LADDERS

A complete line of safety ladders in 1, 2, and 3-section types ranging from 10 ft. to 65 ft.

No. 6061 **No. 6062**

PORCELAIN TELEPHONE KNOBS

Stromberg-Carlson offers telephone knobs in a wide variety of sizes.

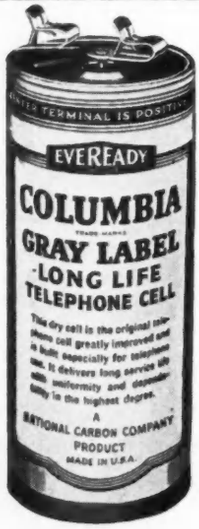


No. 12 HTL-85 WIRE

Extra-galvanized by the *Crapo* patented process.

RELIABLE RU UNPROTECTED CABLE TERMINALS

Capacities 6 to 26 pair.



"EVEREADY"
"COLUMBIA"
"GRAY LABEL"

Long Life Dry Cells with Fahnestock connections. Specially designed for telephone work and light drain service.

COOK TYPE O SUBSTATION PROTECTORS

Weatherproof and fireproof. May be mounted in or outdoors.

MACHINE BOLT

LAG SCREW

CROSS ARM BRACES

SQUARE WASHERS

Stromberg-Carlson features a complete line of pole hardware.

HEMINGRAY No. 42 INSULATOR

Standard for many years. Its long leakage path keeps toll lines trouble-free.

HEMINGRAY No. 10 INSULATOR

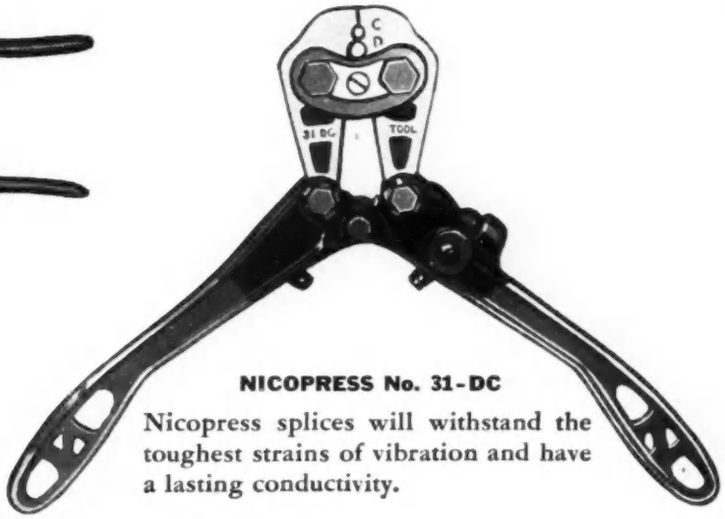
The exchange line pony with double groove. Standard on many telephone lines.

HEMINGRAY No. 16 INSULATOR

Has square groove which provides substantial support for line wire.

NICOPRESS No. 17-2

Convenient and practical for linemen to handle either in the air or on the ground. Pressure can be applied with the certainty that each compression will be exactly as required.

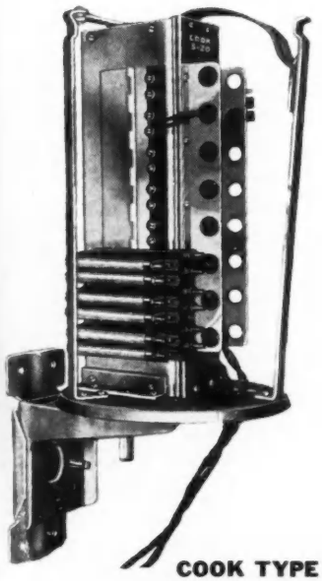


NICOPRESS No. 31-DC

Nicopress splices will withstand the toughest strains of vibration and have a lasting conductivity.

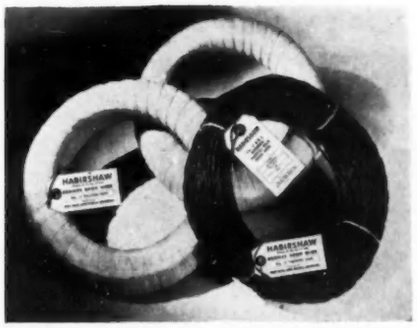
NICOPRESS No. 12 BWG SLEEVES

NICOPRESS No. 17 B & S SLEEVES



COOK TYPE S-20 CABLE TERMINALS WITH H-20 PROTECTOR UNITS

Capacities 6 to 26 pair.



HABIRSHAW No. 17 BRONZE DROP WIRE

Distributed Exclusively by Stromberg-Carlson

High strength bronze conductor; expertly blended synthetic rubber insulation; soft, unbleached cotton braid, thoroughly saturated to provide long-lived, moisture-resisting covering.

STROMBERG
PROGRESS IN TELEPHONY
CARLSON

Exclusive WITH STROMBERG-CARLSON

This New Type STURGIS METAL CHAIR

WPB has now authorized the manufacture of a new metal operator's chair which is distributed exclusively by Stromberg-Carlson.

This chair is available in the following heights:

Seat Height Adjustment (Inches)	18-22	20-24	22-26	24-28	26-30	28-32
Foot Rest Height from Floor (Inches)	5	6	8	10	12	13

The base is made of sturdy 1-inch diameter steel tubing with all joints neatly welded. Circular foot rest constructed of ¾-inch diameter steel tubing.

Back support may be easily adjusted up or down for any size individual. Seat height is adjustable by revolving seat.

Chair Base is furnished in brown enamel finish.

Seat is genuine brown leather over curled hair pad; width 16½ inches; depth 14½ inches.

Back is plaited, curved, 8-inches high, 13-inches wide. Upholstered in genuine brown leather over curled hair.

ARMY E NAVY

WINGED MAIL

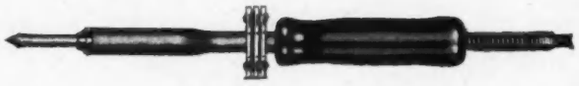
Faster than a carrier pigeon—and far surer—is the V-Mail way to keep those in the service up-to-the-minute on back-home news. Use V-Mail—write often and keep up the morale of those far away.

STROMBERG CARLSON

PROGRESS IN TELEPHONY

DRAKE A NAME TO REMEMBER for RELIABLE SOLDERING EQUIPMENT

Through 25 years of soldering iron manufacturing, Drake has developed soldering products that set new high standards of quality and long-lived performance.

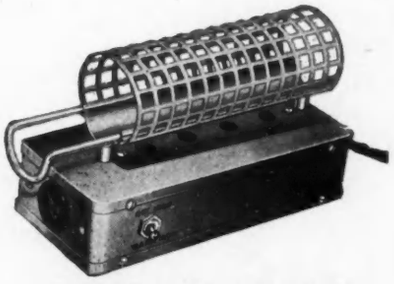


DRAKE No. 400, for example, is ideal for work in small places—weighs only 8 ounces and is only 9 inches long, yet it is a 60-watt iron.

DRAKE No. 600-10, is conservatively rated at 100 watts, but is only 10 inches long.

DRAKE SOLDER POTS

are available in 150 and 300 watt ratings to meet varying needs.



DRAKE HEAT CONTROL

is a fool-proof device for keeping idling irons ready for quick use.

*GraybaR QUALITY SINCE 1869 *REG. U.S. PAT. OFF. Distributed by *GraybaR ELECTRIC COMPANY

Immediate shipment from stock on moderate quantities with priority rating of AA-5.

DRAKE ELECTRIC WORKS, INC.
3656 LINCOLN AVE. CHICAGO 13, ILL.

MODERN CONSTRUCTION METHODS require

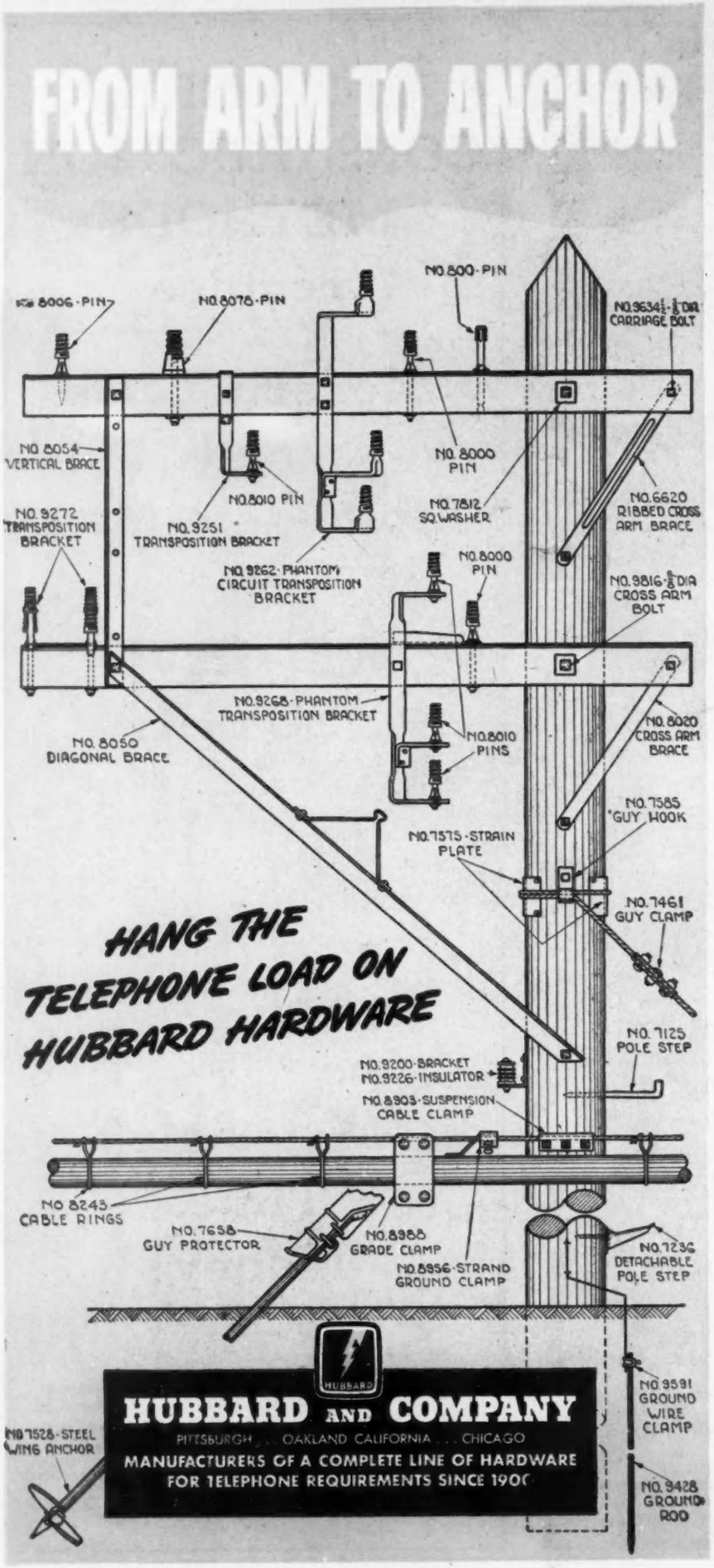
Modern Tools and Up-to-date Men

WE HAVE BOTH!

Proper Application of both— saves

Materials! Time! Money!

GUSTAV HIRSCH ORGANIZATION
310 West Broad Street Columbus 8, Ohio
Telephone—Main 6533



25 YEARS AGO THIS MONTH

Taken from TELEPHONE ENGINEER files of April, 1920.

THE TELEPHONE systems of the country, taken over by the government during the war, were returned just a few months ago, as seriously in need of help as the railroads, about which in 1920 there was much clamor for proper legislation for their preservation. The high cost of labor and materials during the war and afterwards has prevented many companies from maintaining their plants up to the old standards of efficiency, said TELEPHONE ENGINEER in April, 1920. If telephone service is to attain the standard needed and demanded by the public, its income will have to be made adequate.

★

THE ELYRIA (Ohio) Telephone Company, which had been operating under the automatic telephone system for over a year, installed in the Elyria Chamber of Commerce rooms 26 separate lines with extensions to assist the Community Chest. In 1919 there were 700 contributors and $55,000 raised, and in 1920, under the telephone plan, 3,700 contributors and $98,000 raised. Each solicitor reached scores of people by phone who were previously missed in the campaign.

★

A COMPLETE picture story of the Home Telephone & Telegraph Company of Fort Wayne, Indiana was presented to TELEPHONE ENGINEER readers in 1920, including a portrait of General Manager Frank E. Bohn (now president).

★

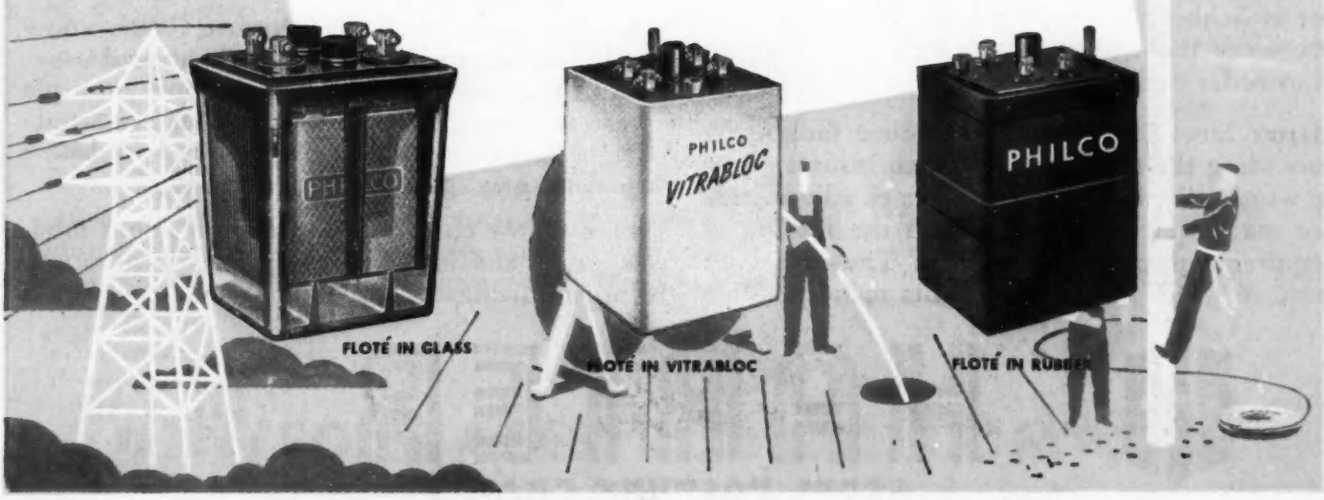
"MAXIMUM rates and minimum service sometimes go hand in hand, but never far," said Murphy Candler, chairman of the Georgia Railroad Commission before the Atlanta Telephone Association. Given time, the public rightly acts as the grave digger instead of the chief mourner. He emphasized good service as the forebear of fair rates.

PHILCO

gives you the latest in Modern Telephone Battery Design!

FOR THE SPECIAL needs of the Telephone Industry, Philco provides the famous Floté element. This basically different battery, with its longer-lasting grid cast in a new high-efficiency metal marks a major advance by eliminating low cells in full float service, by reducing maintenance and charging costs, and by materially increasing battery life. Providing high capacity, compactness, toughness and long trouble-free service, Philco Floté is widely rated as the standard Telephone Battery. It is available in modern steel glass, rubber and Vitrabloc jars—in capacities and sizes for all central station and PBX operations. Write for latest catalogs. PHILCO CORPORATION, Storage Battery Division, Trenton 7, New Jersey. *Makers of the Famous Philco "Thirty".*

For 50 years a leader in Industrial Storage Battery Development

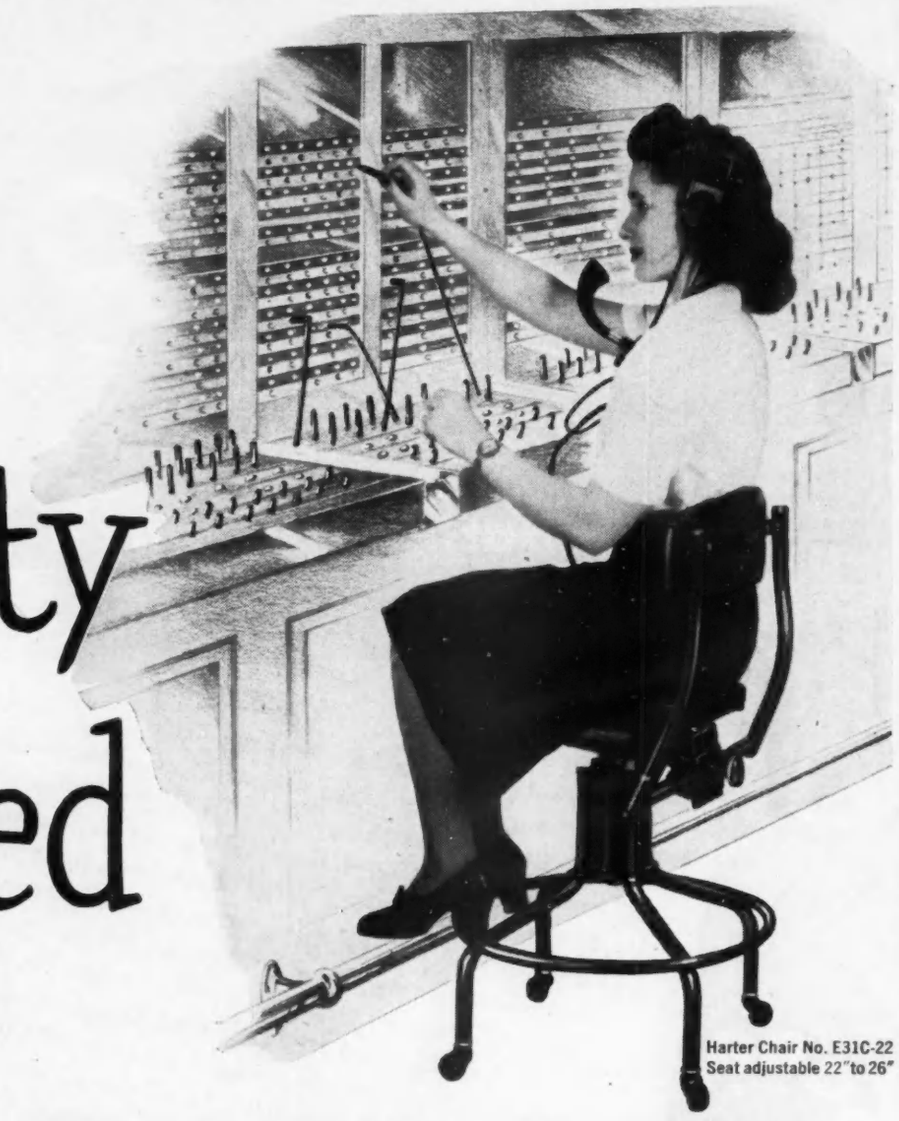


FLOTÉ IN GLASS

FLOTÉ IN VITRABLOC

FLOTÉ IN RUBBER

No Priority Needed



Harter Chair No. E31C-22
Seat adjustable 22" to 26"

HARTER POSTURE CHAIRS
FOR SWITCHBOARD OPERATORS

You may now obtain Harter Steel Posture Chairs for switchboard operators *without priority.* Simply write the words "for switchboard use" on your order or inquiry.

Harter Steel Posture Chairs reduce fatigue by providing the firm support which insures proper weight distribution. Seat and back adjustments are made quickly and easily to the individual requirements of each operator. The improved posture which these adjustments make possible insures greater comfort and increased efficiency.

Our complete line of Steel Posture Chairs—now available without priority for switchboard use—features models for both single and multiple position boards. Constructed of steel and attractively upholstered, they are finished in baked enamel—gray, green or brown.

Write us for complete information about models, prices and installations. Harter Corporation, Sturgis, Michigan.

HARTER
STEEL POSTURE CHAIRS

BUY MORE
WAR BONDS

When Laytex-insulated wire first reached New Guinea, the natives were puzzled about its purpose. So were the inhabitants of other lands—from the Solomons to Mongolia.

For Laytex has gone into many, many regions where no wire had ever gone before. Under arctic cold, steaming tropic heat, the shattering shock of heavy explosions, Laytex performs better than was ever expected of any wire.

The entire output of Laytex Wires and Cables goes to fill the needs of war. But in a not-too-distant future the advantages of Laytex will be available for a long list of important home services... Buildings, Police and Fire Alarms, Communications, Signalling, Power, Control, and many more.

Rubber Insulation at Its Best

U.S. Laytex

ELECTRICAL WIRES AND CABLES

Serving Through Science

UNITED STATES RUBBER COMPANY

1230 SIXTH AVENUE, ROCKEFELLER CENTER, NEW YORK 20, N. Y. • *In Canada:* DOMINION RUBBER CO., LTD.

ACORN INSULATED WIRE

DROP WIRE ★ BRIDLE ★ INTERIOR ★ TREE ★ GROUND ★ SWITCHBOARD ★ JUMPER ★ BURIED WIRE ★ FIXTURE ★ INSTRUMENT ★ CABLE TERMINAL ★ POTHEAD ★

Your specifications can be met with a wide variety of materials in the form of conductors (solid or stranded: copper, bronze, copper-weld, iron, aluminum, etc.), insulation (rubber, plastic, synthetics, etc.), and braids (cotton, glass, silk, etc., with a variety of braid treatments).

ACORN INSULATED WIRE CO., INC., 225 KING STREET, BROOKLYN 31, N. Y.

LEICH SALES CORP., 427 W. Randolph St., Chicago

LINDSAY SUPPLY CO., 4815 Superior Ave., Cleveland

April 9th, 1945

MEMBERS OF THE TELEPHONE INDUSTRY:

The Management of the North Electric Manufacturing Company have become aware of rumors and have been specifically informed of statements by persons in positions of authority, that the corporate entity of The North Electric Manufacturing Company, the stock control and ownership, and the officers have passed under the control of other interests.

The fact is that during the last twenty years there has been no change of ownership of the corporate entity of The North Electric Manufacturing Company, no sale or contract to sell the controlling stock ownership, no change in the majority voting control of the Company, no change in the essential personnel of voting control, no change in the essential relations between the Company and its customers the Independent Operating Companies, no change in the policies of the Company, no change in the principal officers, and none is contemplated for the future.

The North Company, as heretofore, recognizes the essential continuity through decades of standards, design and production for the Independent Operating Companies and its policy is still to maintain such service for the telephone industry.

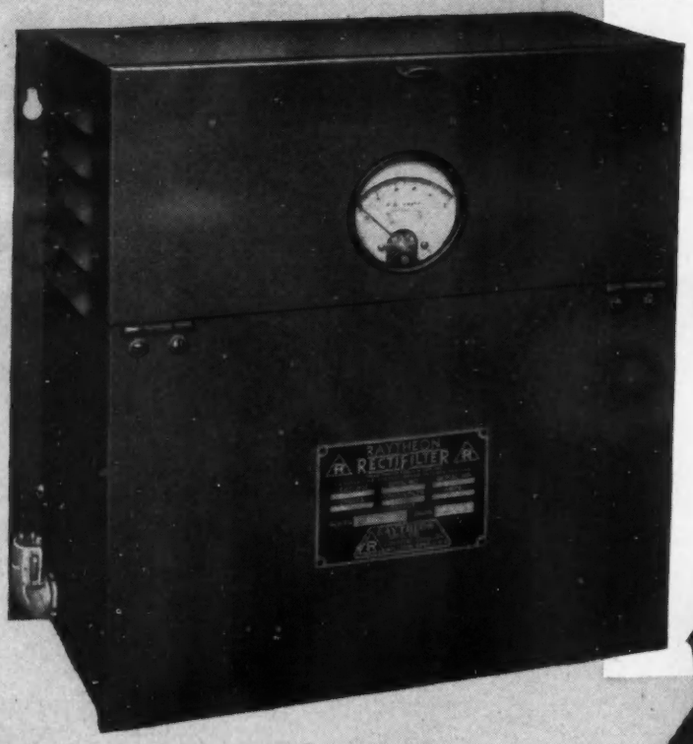
F. R. McBERTY,

President

THE NORTH ELECTRIC MFG. COMPANY, GALION, OHIO

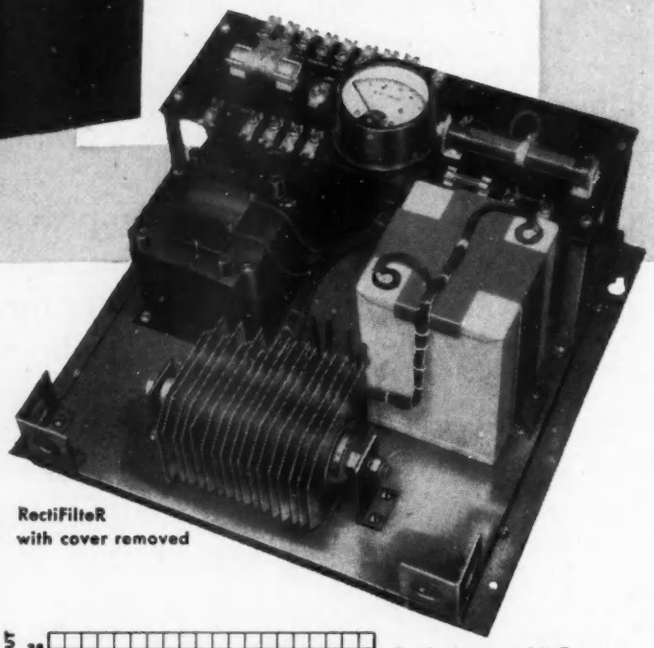
RAYTHEON RECTIFILTERS

(BATTERY ELIMINATORS)



Improve Service and Save Money

IN PBX AND PAX SYSTEMS

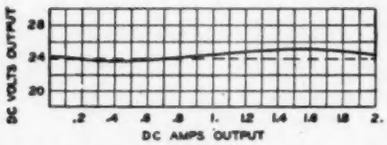


RectiFilteR with cover removed

No matter what the system, PBX or PAX, Raytheon Recti-FilteRs provide a sure, dependable source of power by converting A. C. directly to D. C. thus eliminating storage batteries. Because they are entirely automatic in operation, they are equally efficient in attended or unattended locations. Here are some advantages of using RectiFilteRs:

- Eliminate batteries and the expense of routine service.
- Provide stabilized D. C. output voltage from no load to full load.
- Minimize power costs because of high efficiency in converting A. C. to D. C.
- Save $30 to $90 a year.
- Release charging cable pairs for revenue producing service.

RectiFilteRs have no moving parts . . . require no maintenance. Write for Bulletin.



Typical curve of D.C. output voltage under varying load conditions indicating uniform voltage.

Tune in the Raytheon radio program: "MEET YOUR NAVY," every Saturday night on the Blue Network. Consult your local newspaper for time and station

RAYTHEON MANUFACTURING COMPANY

Electrical Equipment Division

190 WILLOW STREET, WALTHAM, MASS.

The coveted Army-Navy "E", for Excellence in the manufacture of war equipment and tubes, flies over all four Raytheon Plants where over 16,000 men and women are producing for VICTORY.

Devoted to research and manufacture of complete electronic equipment; receiving, transmitting and hearing aid tubes; transformers; and voltage stabilizers.

At This Sign

Copperweld

CONQUERS CORROSION

COPPER TO COPPER CONTACTS

Because there are no dissimilar metals in contact, the possibility of corrosion is eliminated and high resistance connections cannot occur when you use Copperweld non-rusting Ground Rods and Clamps. And with them you provide an all-copper circuit from the top of the pole to the bottom of the ground rod.

They have other advantages, too. The stiff steel core makes the rod easy to drive. The rugged one-piece clamp body provides a simple, dependable connection. Copperweld's unique method of manufacture insures safe, trouble-free ground connections during a lifetime of service

MADE BY
COPPERWELD STEEL COMPANY
GLASSPORT, PA.

Copperweld NON-RUSTING **GROUND RODS AND CLAMPS**

NATIONAL SALES AGENT:
HUBBARD AND COMPANY PITTSBURGH, PA.

The Coming Era of Construction

WE think the Independent telephone industry is facing in the early postwar years, the greatest job of construction it has ever experienced in a similar period of time. This applies particularly to the smaller Independent telephone companies, for several reasons.

One reason is that many of these small companies were unable, after the depression and before defense and war restrictions became effective, to do the rebuilding or rehabilitation work, or to make the conversions or do the modernizing work they would otherwise have done. Much of this would have been done in the past five years if equipment, materials and manpower had been available during that time—but they were not.

Many plants are, therefore, now suffering from the accumulated wear and tear and obsolescence of a span of years which includes both the depression period and the period of war restrictions.

A telephone plant, like many other things, can be patched up and kept going for a fairly long time, but not forever. Like the "one hoss shay," the day eventually comes when all the patchwork in the world will not keep it going longer on a serviceable and even reasonable economical basis.

But, to successfully meet the conditions of the postwar times that are coming, something more is going to be needed than merely the rehabilitation of old telephone plants.

There will be many new and improved things of all kinds available to the public after the war. The early postwar years are going to be the greatest period of what might be called "realized obsolescence" Americans have ever experienced. The prewar radio, automobile, electrical refrigerator and other electrical appliances, and hundreds of other articles used in everyday life, are going to rapidly become as extinct as the fabled Dodo. The American public—which believes more than any other nation in keeping itself "up-to-date"—will insist upon having the new and modernized versions of all those things as soon as possible.

In the face of this situation, can anyone believe that Americans, even in the small towns and on the farms, are going to be satisfied in postwar years with antiquated telephone service?

Added to all that, small telephone companies face another need for expansion which, in most cases, will require construction. That need arises out of the present farm telephone issue.

Many more telephones are going to be installed on farms, whether the pending rural telephone legislation is enacted or not. That is because, if the legislation is enacted, it will be the business of a governmental agency to put telephones on farms. If the legislation is not enacted, that will be principally because the telephone industry is willing to take upon itself the job of putting many more telephones on farms.

IN either case the small Independent companies, being mostly out where the farms are, will have to do their part of the job. It seems to be no small part, since there is data which shows that almost one-third of the farm telephones in the United States are in the operating territories of small locally-owned telephone companies operating exchanges of fewer than 500 stations each.

These are the postwar jobs facing the Independent telephone industry — rehabilitation, modernization, expansion, particularly farm expansion. In the aggregate, this is a big job. The largest number of Independent exchanges affected are the small exchanges owned and operated by the little companies.

The Independent telephone industry has never faced a situation quite like this before. In it there lies a great opportunity for all Independent companies — the opportunity to bring their plants and service up to the highest level they have ever known. It is likely that, if and when that is done, the small units of the Independent telephone industry will be more profitable than they have ever been before.

There is a big job ahead—one that will tax the planning ability, experience and energy of all Independent telephone people. It is to this big job, the coming era of construction, that Telephone Engineer & Management dedicates this issue.

NEWS Briefs...

Independent Companies Provide Most of Form 10 Wage Cases, Approved by NWLB

The NWLB in the past two weeks has approved over two score of Form 10 voluntary wage adjustments which has been reviewed and sanctioned by its National Telephone Panel. Eighteen of the wage adjustments involved Independent companies, one was a cooperative telephone company and seven were presented by Bell companies. The A.T.&T. Long Lines Department had four Form 10 adjustments.

The other Bell cases involved the Mountain States Tel. & Tel., including the Federation there and the Association of Telephone Employees; the New England Tel. & Tel. in connection with its revenue accounting employees.

The Independents were the Ohio Consolidated, Ohio Standard, Warren Co., Southwestern States Co., Central Telephone Co., Sullivan Telephone Co., South Carolina, Continental, Mankato Citizens Tel. Co., Palestine Co., Lexington Co., Ozark Central, East Coast Telephones, Inc., and Delta County Cooperative Telephone Co.

OPA to be Notified

The North Carolina Utilities Commission orders all companies petitioning their commission for increased rates to submit date showing that the OPA has been notified of the proposal and a notation to that effect, which is to appear on the application for the rate increase. Hearings are to be set not earlier than 30 days from date of filing, and the OPA may intervene in all rate increase cases.

Rate Applications

The Kasson & Mantorville (Minn.) Telephone Company; United Telephone Company, West Concord, Minn.; Farmers Telephone Company, Emmons, Minn.; Dunnell (Minn.) Farmers Telephone Company; and the Washington County Rural Telephone Company, Cottage Grove, Minn., have all recently applied to the Minnesota Railroad and Warehouse Commission for increases in rates.

Telephone and Telegraph Companies Asked to Reduce Steel Purchases

Because substantially increased military requirements for steel in the second quarter of this year have reduced the amount available for non-military use below quantities previously available, the WPB Communications Division in an administrative letter is urging all telephone and telegraph operators to defer or reduce to the fullest extent second quarter orders for steel placed under authority of Utilities Orders U-3 or U-4. Orders for steel wire and strand in particular should be deferred to third quarter delivery whenever this can be done without serious interference with service, the WPB letter stated.

Operating communications companies were further urged to defer deliveries of steel for plant additions authorized on Form WPB-2774 wherever this can be done without jeopardizing the completion of urgent projects on schedule.

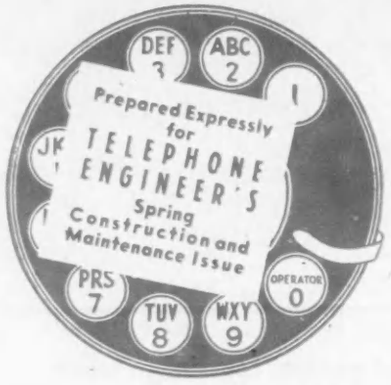
It was understood that proposed revisions of U-2 and U-3 orders, especially to liberalize the use of plugs and jacks for essential users, are now being studied for submission at the forthcoming Telephone Operating Industry Advisory Committee meeting.

FCC Chairman Porter Presented Award to "Telephone Hour"

FCC Chairman Paul A. Porter made the presentation of the George Foster Peabody Radio Awards, which included an award to the "Telephone Hour" of the Bell System over the NBC network at a dinner in New York, April 10. The "Telephone Hour" was voted outstanding entertainment in music because it sets an excellent standard . . . with the greatest living artists" and special appreciation was expressed for the five broadcasts by Fritz Kreisler, who made his first radio appearance on the program.

U. S. soldiers simultaneously lay wire, and enjoy a horse and buggy ride in Bubingen, Germany. (Signal Corps Photo-Acme)

HELPFUL KINKS *for Plant Men*



Ringer and Generator Test Circuit

DURING these days of material shortages many pieces of telephone equipment are being repaired and kept in service which would in normal times be replaced. In the shop repair of magneto telephones a convenient and satisfactory method of

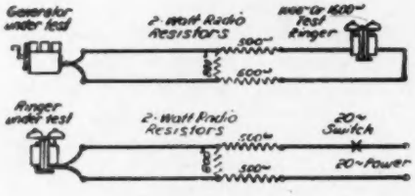


Fig. 1—Artificial networks used in testing Ringers and generators.

testing generators and ringers to insure that they are properly adjusted for maximum efficiency is to operate them through artificial networks which simulate line conditions. Fig. 1 illustrates two networks designed for testing either a generator or a ringer under conditions which are comparable with those that exist on a long multi-party farm line. The networks consist of readily procurable two watt radio type resistors. The circuit is self explanatory.

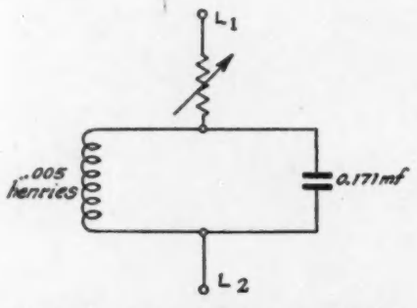


Fig. 2—Simple equalizer for improving high frequency response of exchange cable.

Cable Equalizing Circuit

OCCASIONALLY a small telephone company is called on to transmit high quality radio program material through ordinary exchange cable. The cable pair capacity causes the higher audio frequencies to be attenuated to a greater extent than the lower frequencies, hence the audio frequencies may be distorted in passing through the cable. The frequency response characteristics of exchange cable can be substantially improved by the use of a relatively simple **equalizer circuit.** Fig. 2 illustrates the three components of this circuit. The variable resistor is adjusted to give the best response. The equalizer may be connected either at the sending or receiving end of the cable.

Transposition Switch

WHEN it is necessary to cut in a number of transpositions in a working toll circuit, the service is disrupted each time the circuit is cut and during the time the wires are being interchanged and spliced. This can be avoided by the use of a double pole-double throw switch equipped with reversing wires and connected to the line by means of test clamps as shown in Fig. 3. The switch is thrown at the instant the wires are cut and this reverses the original connection of the wires and the linemen may then complete the splicing operation. Line current flows through the switch rather than directly through the wires while the splice is being made. A somewhat similar arrangement can be used for phantom circuits; however, in this case either a similar switch or relay switching equipment is required at the office.

Useful Tone Test Set

A TONE set is useful for many different purposes in a telephone exchange. Identification of cable pairs, tracing interior wiring, checking the balance of a cable pair by means of a center tapped receiver are typical of the many uses. A highly satisfactory tone set can be easily wired up using an ordinary local battery induction coil, a lungen type buzzer, two condensers and three dry cells connected as shown in Fig. 4. The set can be made very compact if flashlight cells are used.

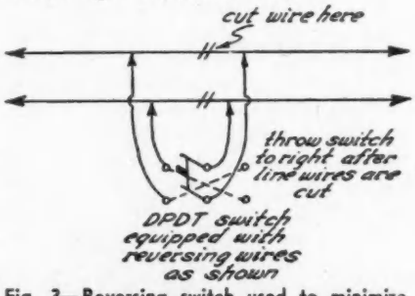


Fig. 3—Reversing switch used to minimize interruptions due to cutting in transpositions on working lines.

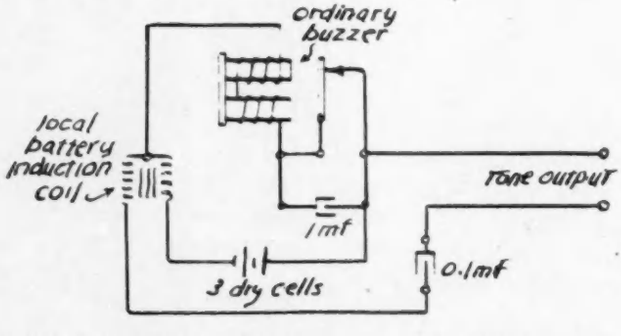


Fig. 4 — Efficient tone test set circuit.

Wet Weather Testing Circuit

A METHOD that has been employed with good success for the early detection of moisture in cables makes use of a circuit as shown in Fig. 5. In this circuit one or more vacant pairs in each 25 pair cycle of the outside cable plant is connected to the contacts of a **rotary stepping switch.** The contacting arm is connected in series with a wire chief's high resistance ohmmeter and ground as shown. During wet weather the test men can quickly connect the ohmmeter to each of the vacant pairs in the 25 pair cycle and note whether there is any indication of leakage. This method enables wet cables to be detected before the entire cable is out of service. This same principle can be applied by simply testing vacant pairs with a portable ohmmeter at the MDF, however, this is less convenient than the automatic method shown.

Handy Test Lamps

FOR testing a common battery exchange a simple pocket tool made up of a fibre tube, a steel test prod, and a switchboard lamp arranged as shown in Fig. 6 will be found very convenient.

Convenient Form for Conduit Construction

IT is customary to place a three or four-inch layer of concrete over the top of multiple tile ducts in order to protect them from possible mechanical damage due to subsequent digging operations. Inasmuch as the trench is usually wider then the duct, considerable concrete is wasted. By the use of a wooden form shown in Fig. 7 the concrete can be made to extend only a few inches each side of the duct form, and substantial savings are thus effected. The concrete is poured inside the form. Dirt is shoveled between each side of the trench and the form after which the form is "pulled" and moved to the next location.

Accurate Dry Cell Tests

THE testing of dry cells used in local battery telephones should be done with a voltmeter rather than the short circuit ammeter that is generally used. The transmission efficiency of a telephone depends on cell voltage and not the short circuit current capacity of a cell. The correct test for telephone dry cells is to discharge a single cell through a resistance of approximately five or six ohms and at the same time read the cell voltage as shown in Fig. 8. A cell which shows more than 0.93 volts under discharge conditions is regarded as satisfactory and should be left in service.

Checking Rural Telephones

PREVENTIVE maintenance is a good practice in any field at any time. In these days of labor and material shortages it is even more important. One company insists that its trouble men whenever called upon to visit a rural section not only correct

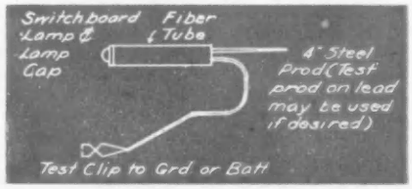


Fig. 6—Simple lamp test gadget for use in C. B. offices.

the reported trouble but that they make a thorough check and adjustment of the instrument and inspection of the station wiring. This takes only a few minutes and will quickly disclose potential faults which might later create trouble and necessitate a return trip.

An overall check is made by disconnecting the instrument from the line and connecting a pocket ohmmeter to the instrument terminals. The proper operation of hook switch, generator shunt springs, condition of nonring through condenser, etc. can be quickly determined by simply noting the readings with the various contact

Fig. 7—For saving concrete in conduit construction.

springs in the operated and non-operated positions. After checking the electrical circuit the ringer and gongs are adjusted for proper response, the the generator screws are tightened and the bearings oiled, the receiver air gap gauged, and the diaphragm

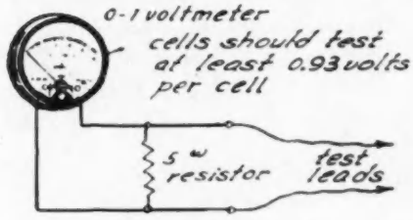


Fig. 8—Correct tests for dry cells.

examined, and the batteries are tested for proper voltage. Fig. 9 illustrates the several steps in checking and adjusting a magneto telephone.

Impedance Measurements

VERY few Independent telephone companies have facilities for measuring the impedance of telephone

(Please turn to page 98)

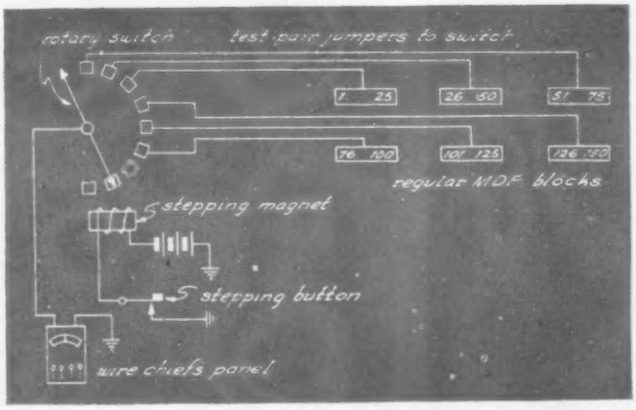


Fig. 5—Wet weather cable insulation test circuit.

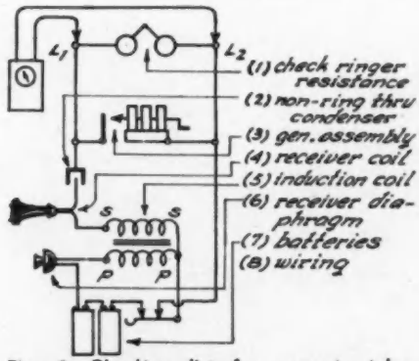


Fig. 9—Checking list for magneto telephones.

TEACH MEN THE

By W. A. CORBETT and H. F. PELTZ
Safety Supervisor *New Jersey Bell Tel. Co.*

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Here is a graphic story of interest to all the "Slims" of the telephone industry. Its illustrations and suggestions will enable the trainer of linemen and the lineman to increase safety of crews and to improve work efficiency.

Climbing tools were designed for the lineman's comfort as well as safety. Some fitting is necessary to determine the right size. To select the proper size measure the distance from about one-half inch below the projecting kneebone to the under side of the shoe at the arch. The size of climber required is the length from the bottom of the stirrup to the extreme end of the leg iron.

POLE CLIMBING is one of the skilled jobs in the pole-using utility businesses—an art which is learned by constantly practicing all the little details. A good climber never forgets the importance of doing the little things correctly. He knows they make up the technique that has proved best by long experience and constant study. That's why he doesn't have accidents —why he climbs so smoothly and with so little effort.

Recognizing these facts, the New Jersey Bell Telephone Co., as part of their effort to reduce accidents and to improve working efficiency, launched a program to train men in the art of climbing. An integral part of that training program was a carefully prepared color movie in which all of the fine points of climbing were demonstrated. Selection and care of gaffs, safety belts, climbers' clothing and all of the equipment of a lineman, and the wearing and use of that equipment together with proper climbing techniques were taught in the film. The accompanying illustrations show how many of these important points in the art of climbing were demonstrated in the movie.

Most Bell System companies have available copies of the motion picture, "The Art of Climbing." It is suggested that those who are interested in seeing it contact the General Plant Employment Supervisor of the Bell System Telephone Company in their area. For those interested in purchasing a copy, write to the General Plant Employment Supervisor, New Jersey Bell Telephone Co., 540 Broad St., Newark, N. J.

Gaffs are a most important part of climbing tools. That's why every lineman should check his gaffs at least once a week to make sure they are in good condition at all times. Inspection should include a check with a standard gaff gauge that will permit measuring the width, thickness and length of the gaffs. The gauge takes the guesswork out of gaff inspection.

How the climbers are worn is just as important to comfort and safety as their proper use. Before fastening the leg strap the trouser leg should be pulled up to allow free action of the knee. Then fold the slack of the trouser leg below the knee on the outside of the leg to prevent it from catching on the climber gaff on the other leg. When the slack is properly arranged, there is no fold of cloth between the pad and the leg.

ART OF CLIMBING

High top shoes are essential. Climbing cannot be done in comfort unless high shoes with good soles and heels are worn. If climbers are worn over low shoes, the strap cuts across the back of the Achilles' tendon and is neither comfortable nor safe.

The body belt should be worn resting on the hips at some comfortable point below the waist line. The way the safety strap is attached to the body belt and the way it is used is most important. Generally right handed men wear the safety strap on the left side of the body belt and men who are left handed wear it on the right side of the belt. The snap hook of the double end of the strap should be engaged in the "D" ring next to the body. Since this snap hook is moveable throughout the length of the loop, by keeping it next to the body the lineman is not likely to pass this end around the pole. The single end of the strap is snapped on the outside of the "D" ring and since this end cannot slide out of reach along the belt, it is always passed around the pole. The snap hooks on the two ends of the safety strap are opposed when both are engaged in the same "D" ring.

Before climbing a man must forget the climbing methods used as a youngster. When he shinnied up a tree as a kid he hugged the tree with his arms to lift his weight and used his legs to hold the distance gained.

Body belts must also be fitted. Comfort with which the body belt is worn will depend upon the location of the "D" ring with respect to the prominent portions of the hip bones. To obtain a belt that fits properly measure the distance across the back between the hip bones.

Pole climbing is just the opposite to shinning up a tree. When climbing a pole the legs lift or lower the weight of the body and the arms merely balance the weight of the upper part of the body.

A good climber understands and practices the fundamentals that make climbing safe and easy. The first thing to learn is how to walk with climbers on. The proper stride will prevent a lineman from spurring his leg or foot.

The measurement between hip bones is the size of body belt required and is identical with the measured distance in inches between "D" rings.

Best penetration of the climber gaff is obtained by raising it upward and outward and bringing it downward and inward at an angle of about 30 degrees between the leg iron and the pole.

Now let's consider the path of the gaff on the pole. If the feet are kept too close, they not only get in the way of each other but the climber may spur himself.

Hand grasp and hand movement are just as important as feet and climber movements. The hands, as well as the gaffs, should travel up or down the pole in well defined paths. Rest the palms flat against the pole at a point between the side and back of the pole.

Good climbing requires doing many things well. Bring the gaff upward and outward, downward and inward at a 30 degree angle. Space the gaffs to follow a well defined path up the pole, thereby reducing body sway. Keep the "riser step" short to control the balance. Gaffs are not driven into the pole but are inserted with just enough pressure to give satisfactory penetration.

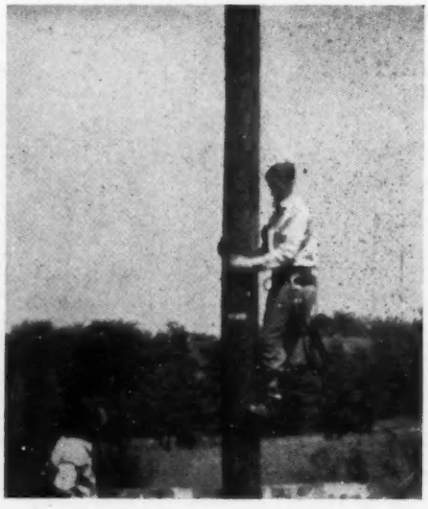
Extreme or wide separation of the gaffs is not only awkward but may easily cause cutouts.

In climbing a pole the body will swing from one side to the other. The degree of this swing depends upon the size of the "riser step"—the distance between the right gaff mark and the point where the right gaff is next inserted or between the left gaff mark and the point where the left gaff is next inserted. Too long a "riser step" will cause the body to lunge from one side to the other. The correct "riser step" is short enough to maintain a uniform body balance so that the body will only shift slightly from plumb to right and from plumb to left.

The body position used when climbing has a lot to do with how quickly the arms tire. If the body is too far away from the pole, the arm strain will be noticed quickly.

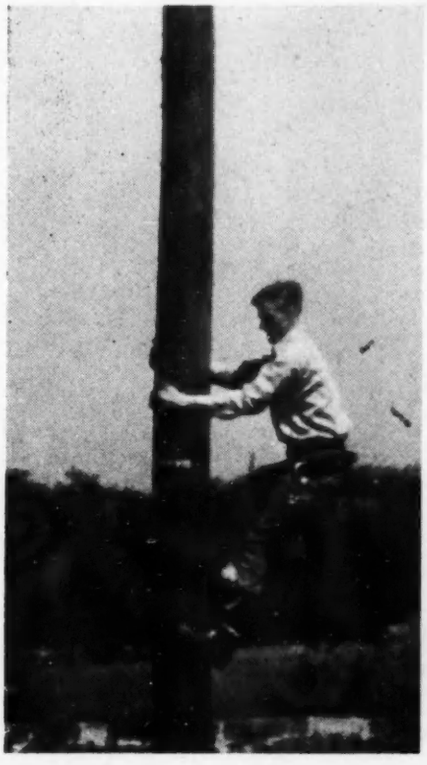
The best way to travel up or down a pole is in a well defined path, the path made by the gaffs being approximately 4½ inches apart. This distance may vary slightly with different men depending upon their heights, and construction on a pole may make it necessary to deviate from a straight path up or down.

If the body and the knees are brought too close to the pole so that the angle between leg irons and the pole is less than 30 degrees, a cutout may result because gaffs no longer hold the weight of the body.



Cutout was caused by position shown at left where the gaffs would not hold the weight of the body.

To maintain vertical balance on the pole a semi-crouch position should be assumed with the tail kept away from the pole. The climber should not hug the pole. He can tell easily when he has the proper body position because there will be no strain on the arm or the legs.



In climbing there must be co-ordination between arm and leg movements. This is different from the natural swing of legs and arms as in walking.

When climbing the left arm and left leg are swung together, then the right arm and right leg. Unless arm and leg motions are synchronized, it is impossible to maintain body rhythm and balance. Without this rhythm it is difficult to follow a well defined path up or down a pole.

Left, when approaching the point on a pole where he is to use his safety strap, the lineman drives in his right gaff, if he is right handed, at a 30 degree angle about one step higher than the position of his left gaff. He maintains the left gaff at a proper angle by keeping his left knee stiff. This position brings the right hip closer to the pole so that there will be enough slack in the safety strap as the snap hook is engaged in the "D" ring. It also prevents the knees and body from moving too close to the pole during the operation and lessens the possibility of a cutout.

In applying the safety strap after reaching a working position on the pole, the "D" ring is grasped in the upturned palm of the hand with the snap hook lying in the middle joints of the last three fingers. The heel of the hand backs up the "D" ring and prevents it from moving as the fingers provide pressure to the back of the snap hook as it engages the "D" ring.

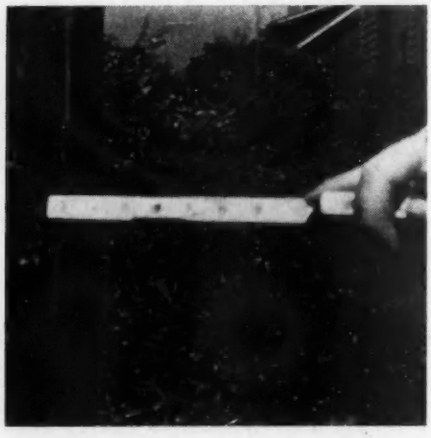
A good lineman never depends on the sound of the snap hook engaging the "D" ring. He ***looks, feels*** and ***knows*** that the snap hook is engaged. If he depends only on the sound of the click, he may hear a bang as he hits the ground.

If work is done with the safety strap extended too much, the arms will soon become tired from excessive reaching.

Raked and crooked poles are always climbed on the high side. Before climbing decide the path to follow up the pole. Climbing the high side prevents the strain on the legs which occurs when climbing the underside of such poles.

If there is a strong wind and the lineman keeps his feet together with the gaffs on a horizontal plane, the wind may swing him around causing him to lose his balance.

If the strap is too short, the arm swing is hampered and the man is in danger of cutting out.



Poles become weather checked from exposure to the elements but these cracks, which, in some poles are several inches deep, do not necessarily mean that the pole is defective or unsafe to climb. A lineman, however, must be on the lookout for such cracks for if the gaff of the climber should enter one he may lose his balance.

He can resist the wind by doing exactly what he would do if someone pushed against him —stagger his feet by placing one climber a little higher than the other—that gives a prop to resist its force.

Whenever possible the strap should be adjusted to its proper length before climbing a pole. Proper length of the strap depends on a man's height. For comfort and safety it should be lengthened or shortened so that work can be done with the safety strap at a right angle to the line of the legs.

Personalities IN THE NEWS

Colonel **J. C. Grable,** after 22 months service in General **MacArthur's** headquarters and the past 10 months as Signal Officer for the Second Air Force headquarters, has been made chief of the wire branch in the office of the Air Communications Officer, General **McClellan.**

●

Ezra Stevens, formerly with the Raytheon Mfg. Co. and well known in the telephone industry, is now head of the Stevens Arnold Co., South Boston, Mass., which is very busy manufacturing amplifier equipment for the Navy.

●

Clarence E. Berry, who has been an engineer with the Western Electric Co. at its Hawthorne and Kearny, N. J., Works for 45 years, died last month after a brief illness. He was 61 years old and a member of the Telephone Pioneers of America.

●

Samuel F. Merriam, who has been serving as general traffic manager in the Greater Washington area since 1936, is the new assistant vice president of the Chesapeake and Potomac Telephone Co. **William H. Trapnell,** the new general traffic manager, held that same post for the C. & P. of Virginia the last five years.

●

Ray Palmer, manager of the Citizens Telephone Company of Maynard, Minnesota reports some service par excellence which was overheard in their central office while an operator was handling a long distance call to Clara City. The customer wanted Mrs. Kleinhagen. When the operator replied that there were two Mrs. Kleinhagens in Clara City, the long distance customer said, "It's the one who advertised a washing machine for sale." And the call was completed.

Marshall B. Downing, 68, retired vice president and general manager of the New York Telephone Company, died January 23 at his home in Brooklyn, N. Y. He retired in 1939 after 40 years' service. His death follows a long illness.

●

Merle Hale, now acting commercial superintendent of Lincoln Tel. is expected to be appointed later to the full title of commercial superintendent.

W. Hamilton Walter

W. Hamilton Walter, well known to the Independent telephone industry, has been made vice president in charge of sales of the North Electric Manufacturing Company, Galion, Ohio.

●

Richard F. Sullins, owner and manager of the Madison (Mo.) Telephone Co., has entered the armed services as an Electrician's Mate 2/c in the Seabees. **J. R. Carter,** of Perry, Mo., will pinch hit for him on a part time basis during his absence.

Colonel **Vernon B. Bagnall,** Chief of the Communications Engineering Branch of the Signal Corps' Army Communications Service and former radio engineer and circuit layout engineer of the A.T.&T. Long Lines department, was recently presented with the Bronze Star Medal for meritorious service while fulfilling an important special assignment in the planning and supervision of the Headquarters Communications Zone Signal Center in France last September and October.

●

Frederick S. Patterson, 53 years old, division superintendent on the eastern side of Manhattan for the New York Telephone Co., died recently. He had been with the New York Telephone Co. since 1912.

●

Chairman **B. D. Biggs** of the Illinois Commerce Commission is the new president of the NARUC with the retirement of President **McConnaughey.**

●

Capt. Arthur Domike has returned to his former job of West Coast district station installation supervisor for Associated Telephone Company, Ltd., Santa Monica, California. He has an honorable discharge from the Signal Corps. A soldier during the last World War, Capt. Domike's travelling has been mostly by air this time working with a special services unit in South America and the China-India-Burma theater of war.

●

Commissioner **Duane T. Swanson** of the Nebraska Commission is vice president and chairman of NARUC's executive committee.

●

William H. Browne, 39 years old, a district service superintendent in the Manhattan plant department of the New York Telephone Company, died recently at the Mountainside Hospital, Montclair, N. J.

Telephone Engineer's RADIO COURSE FOR TELEPHONE MEN

CHAPTER 1, SECTION II

See Plan of Study on the opposite page

Basic Difference Between Low and High Frequencies

By B. C. BURDEN
Technical Consultant
Lincoln, Nebraska

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IN the early days of radio it was customary to refer to the *short waves*. These embraced anything below 200 meters (1500 kilocycles). Later as experimenters and research workers learned how to generate and control high frequencies (short waves) the short wave frontier was pushed down and down until the term *short wave* ceased to be descriptive of the vast frequency region extending from 200 meters down to 1 meter. Writers then began to talk about *ultra-short waves*, or *ultra-high* frequencies.

As new developments demonstrated that waves as short as only a fraction of an inch could be generated and harnessed for communication, radar and other purposes, it became apparent that the terminology used in referring to waves and frequencies was inadequate. The FCC solved the problem by setting up and recommending a set of standard terms. Because it is more convenient to think of frequencies than waves they recommended that we refer to the various portions of the spectrum by specific frequency bands carrying designations as shown in Table No. 3.

Table No. 3—*Standard Terminology Recommended by FCC*

Frequency in Kc.		Designations	Abbreviations
10 to	30	Very low	VLF
30 to	300	Low	LF
300 to	3,000	Medium	MF
3,000 to	30,000	High	HF
30,000 to	300,000	Very high	VHF
300,000 to	3,000,000	Ultra High	UHF
3,000,000 to	30,000,000	Super high	SHF

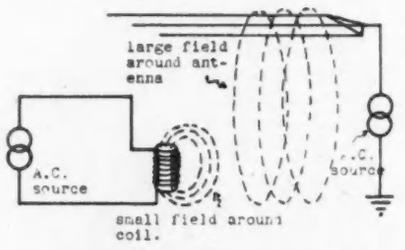


Fig. 2—Relative efficiency of low and high frequency current sources.

Phenomena of Radio Transmission

BEFORE going into the details and theory of radio transmitting and receiving circuits, let us briefly consider the phenomena underlying the transmission of radio waves through space. Radio waves travel through space by virtue of the fact, discovered by early experimenters, that as the frequency of an *alternating current* flowing in a wire is increased, a point is reached at which there is a pronounced tendency for the rapidly oscillating current to escape into space via the electromagnetic waves

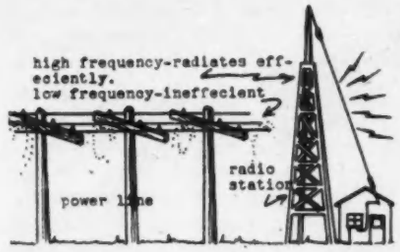


Fig. 3—Need for elevated antennas for efficient radiation.

set up and to never return to the circuit which creates them. We may refer to these escaping waves as *radiated power* or *radiated waves.*

Upon being radiated from the circuit creating them, these waves travel through space in all directions in much the same manner that the rays from an electric light or sound from a loudspeaker travel out into space, never to return to the source unless reflected by some reflecting medium.

Radiation an Electro-Magnetic Phenomena

THIS action of radio waves is an electromagnetic phenomenon as are also the heat and light reaching us from the sun. It has been found experimentally that for radiation to be effective the creative currents must involve frequencies of 10,000 cycles and higher. While theoretically there would be some radiation even at much lower frequencies, the efficiency of such radiation sources is so low that low frequency radiation is not utilized and seldom considered. Fig. 2 illustrates this point.

Tests have shown that the power radiated from a radio frequency circuit *varies approximately as the square of the frequency.* From this, it is apparent that the higher frequencies should be most useful for radio communication. This is true and accounts for the fact that communication over substantial distances can be accomplished with relatively low power at the higher frequencies.

Elevated Radiating Wire Required

IN order to radiate electromagnetic waves into space the radiating circuit must be of such shape and extent that the magnetic field is not confined to the immediate vicinity of the generating circuit. It was found by experimentation that the use of one or more conductors elevated in the air and constituting a portion of a tuned circuit when connected to a high frequency alternating current generator (oscillator) constituted an ideal arrangement for radiating maximum power into space. This elevated wire or wires became known as

Plan of Study
for students of
"Telephone Engineer's RADIO COURSE for Telephone Men"

This special radio course has been prepared for the training of telephone men in the applications of radio principles to the wire communication field.

To make the course more complete and more effective, the author will present at the conclusion of each chapter a series of test questions. These questions are to be answered by students and mailed to the author for correction and grading. (Students need not take advantage of the test questions, grading, etc. unless they so desire.)

Each chapter as described in the General Outline of study at the bottom of this column, will be published in two sections. For instance, the first section of (1) Radio and the Telephone Business, was published in the April 1 issue of FORTNIGHTLY TELEPHONE ENGINEER. The second section of this chapter is appearing in this issue of TELEPHONE ENGINEER & MANAGEMENT. Thus each chapter will be treated in alternate issues of FORTNIGHTLY TELEPHONE ENGINEER on the first of each month and TELEPHONE ENGINEER & MANAGEMENT on the 15th of each month until the course is completed.

Students should have individual copies of each lesson.

To secure the utmost benefit from this Radio Course every student should have his own individual copies of each issue of FORTNIGHTLY TELEPHONE ENGINEER and TELEPHONE ENGINEER & MANAGEMENT. Each lesson and finally the complete course will then be available for reference or review at any time. Only one student to each subscription of TELEPHONE ENGINEER & MANAGEMENT shall enjoy the privilege of having the author correct and grade test questions, and each subscriber shall receive a diploma upon satisfactory completion of the course. If you are not a subscriber to TELEPHONE ENGINEER & MANAGEMENT, send in your remittance now of $1.50, which entitles you to all twelve issues of TELEPHONE ENGINEER & MANAGEMENT as well as the twelve issues of FORTNIGHTLY TELEPHONE ENGINEER. (Extra copies of the first and second lessons are available with new subscriptions.)

GENERAL OUTLINE OF RADIO COURSE

(1)—Radio and the Telephone Business
(2)—Classifications of Radio Systems
(3)—Overall Features of Radio Transmission
(4)—Basic Theory—Tuned Circuits
(5)— " " —Vacuum Tube Oscillators
(6)— " " —Vacuum Tube Detectors
(7)— " " —Phenomena of Radio Transmission
(8)— " " —Field of Use of Various Bands
(9)—Basic Theory—AM Modulation Systems
(10)— " " —FM Modulation Systems
(11)— " " —Vacuum Tube Characteristics
(12)—Typical Applications of Point to Point Radio Systems
(13)—Field of Use in the Telephone Industry
(14)—Application of Telephone Carrier Channels to Radio Channels

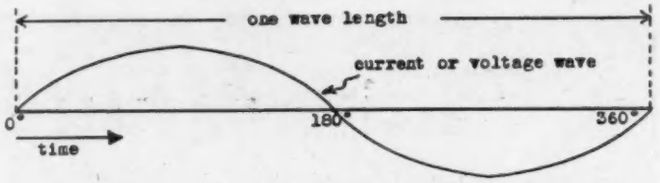


Fig. 4—Graphic representation of one wave length.

Radio waves travel at a velocity of 300,000,000 M per sec.

Distance travelled in one second: $WL = \frac{300,000,000}{freq.(cycles)}$

the antenna or *antenna system*. Fig. 3 illustrates why antennas are needed for efficient radiation.

Explanation of Wave Length

IN a study of electricity, we learn that there are two types of current, namely, (1) direct current (D. C.) and (2) alternating current (A. C.). Alternating current electricity is that type which reverses its direction of flow at a periodic rate. The number of reversals per second is referred to as its *frequency*. When we speak of 60 cycle alternating current, we mean current which reverses its direction of flow 60 times per second.

In dealing with the high frequencies common to radio we must consider a new term seldom mentioned in connection with ordinary electrical work. This term is *wave length*. By definition wave length is the distance a wave travels during one cycle, that is, one complete reversal of alternating current. This term is illustrated in Fig. 4. Inasmuch as the velocity of radio waves in free space is approximately 300,000,000 meters per second (186,000 miles per second) we can obtain the wave length in meters of any radio wave by simply dividing the constant 300,000,00 by the frequency (in cycles) of the radiated wave. For example, the wave length of a 600 kilocycle broadcasting station would be:

$$\lambda = \frac{300,000,000}{600,000} = 500 \text{ (meters)}$$

If we wished to compute the wave length in feet we would use the velocity in feed constant, i.e.

$$\lambda = \frac{982,080,000}{frequency}$$

Note—λ—wave length (in feet or meters)

Frequency and Wave Length Values

It should be noted that the wave length corresponding to the lower radio frequencies, as for example 10,000 K. C. (30,000 meters) is exceptionally high, while the wave length corresponding to some of the ultra high frequencies say 3,000 M. C. (10 centimeters) may be unusually low. Table No. 4 gives frequency vs wavelength values for a number of frequencies from the low to the high end of the spectrum.

Table No. 4—*Relationship of Frequency and Wave Length for Various Values*

Frequency		Wave Length		Wave Length	
10	Kilocycles	98,400	feet	30,000	meters
100	"	9,840	"	3,000	"
500	"	1,968	"	600	"
1,000	"	984	"	300	"
3,000	"	328	"	100	"
10,000	"	98.4	"	30	"
100,000	"	9.84	"	3	"
300,000	"	3.28	"	1	"
1,000,000	"	11.8	inches	30	cm
3,000,000	"	3.93	"	10	"
10,000,000	"	1,18	"	3	"
20,000,000	"	0.59	"	1.5	"
30,000,000	"	0.39	"	1.0	"

In the early days of radio, it was customary to express broadcasting station assignments in terms of meters rather than in kilocycles as is the present day practice.

However, we should have a good understanding of wave length as it is certain that some of the radio applications in the telephone field will require sharply tuned antennas which will be *beamed* from one toll office to another in order to conserve radiated power and minimize interference with other services.

Most of the directive antennas used at high frequencies have several elements (wires) and these are poled or phased in such manner as to produce interacting fields which reflect the energy in the desired direction. Familiarity with wave length phenomena is essential in working with this type of antenna system.

Current and Voltage Distribution Along a Wire

THERE is one other thought that may be somewhat foreign to a telephone man's concept of things electrical yet it must be taken into account in dealing with radio circuits. This is the fact that the voltage or current distribution is not uniform along a wire carrying a high frequency current due to the finite time taken for current to travel from one point to another. At any given instant we may have zero current at one point on the wire and a maximum current at some other point. The higher the frequency, hence shorter the wave length, the closer together are these points of minimum and maximum current.

It should be appreciated, of course, that at any point along a wire carrying radio frequency current or for that matter at any point in space through which radio waves travel that the current and voltage are going through a cyclic variation in the same manner as would be expected at the terminals of the alternating current generator creating these waves.

This non-uniform current or voltage condition along a wire is illustrated by Fig. 5 which shows that in a line 10 centimeters in length and carrying 3000 M. C. radio frequency energy that at a

(Please turn to page 96)

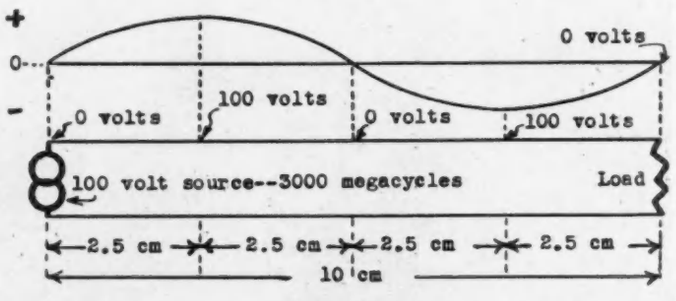


Fig. 5—Instantaneous voltage along 10 centimeter circuit carrying 3,000 megacycle current.

wave length = $\frac{300,000,000}{3,000,000,000}$ = 0.10 meters.

Communications and Electronic Developments

New Wire-Laying Method

New equipment by which combat wire in coil form may be laid by airplane or vehicles or paid out by bazookas and rifle grenades without the use of reels, has been developed by the Signal Corps and is now in production after tests at the Signal Corps Ground Signal Agency at Bradley Beach, New Jersey.

Soldier lashed to infantry packboard and maintaining communication while laying wire. U. S. Army Photo.

An important advantage of the new method, which some experts predict may revolutionize the installation of wire communications, is the fact that wire can be laid manually by mountain, ski or ground troops without the use of reels or auxiliary equipment. Another advantage is silent operation, an important factor in many theatres.

The laying of wire by airplane over mountain peaks, deep valleys or dense forests will greatly simplify the operations of communications troops. In forests or thick jungles it can be laid over the tops of trees or inaccessible undergrowth. One of its principal uses when paid out by bazooka or rifle grenade will be to connect advance patrols or strongpoints in no man's land.

Since the new method of handling wire is suitable for use by jeeps and other Army vehicles, it will reduce the requirements for wire-laying equipment, permit considerable increase in wire-laying equipment, permit considerable increase in wire-laying speeds and eliminate maintenance of certain mechanical parts.

In its search for equipment that would insure maximum effectiveness, speed and mobility in communications operations, the Signal Corps' first problem was to develop a wire coil that could be paid out at high or low speeds without the use of reels.

A special coil and dispenser were designed and successfully tested with rifle grenades, bazookas, man pack, certain types of vehicles including the amphibious "Duck" and from a liasion-type plane which paid out wire at speeds as high as 110 miles an hour.

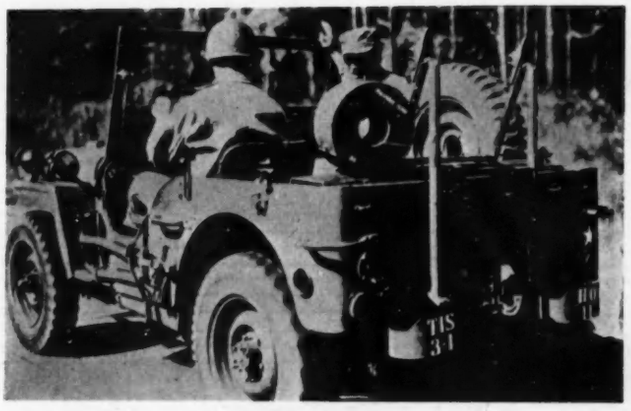
The dispenser is about one foot in diameter and half a foot long and weighs approximately 25 pounds. It contains about 3,300 feet of assault wire. It can be mounted on an Infantry Packboard, carried by the use of a shoulder strap or by hand. Communication may be maintained during the payout process, regardless of the method used for transportation.

Two or more wire dispensers may be connected in tandem when it is desired to lay more than one coil of wire without stopping to make a splice.

A container has been designed for use by the Army Air Force which has a capacity of eight wire dispensers, making it possible for planes to lay a continuous five-mile circuit. Two of these containers are mounted on each airplane, one under each wing, to balance the plane and to lay two circuits at once.

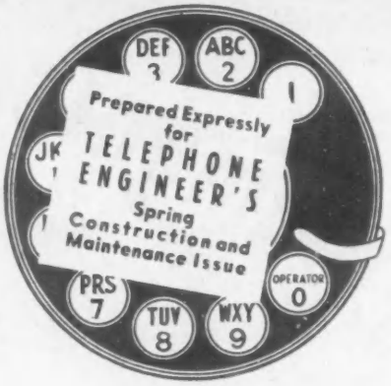
Testing Carrier Telephone System in Mexico

The electronics division of the Aircon Manufacturing Company has been carrying on experimental and developmental work in direct voice communication for railroad use; in communications systems for large buildings, including one method utilizing electric light wires; and a radio system for dispatching and controlling trucks. Aircon also has been recently granted permission to make an experimental railroad installation of long distance carrier telephone equipment between Mexico City and San Luis Potosi, a distance of 313 miles.



Wire being laid at 50 miles per hour. U. S. Army Photo.

Spring CONSTRUCTION *Planning*



THE increasing number of ducks and geese northward bound, the high pitched voices of children playing in the streets and the pleasant odor of backyard bonfires are definite signs that spring is here. To the telephone plant manager spring and summer are welcomed as the seasons in which the ravages of winter storms on outside plant can be repaired.

Fig. 1—One Source of Noise and Crosstalk on Rural Lines.

With the war in Europe nearing its climax and the war in the Pacific still to be won, plant managers are at this time confronted with the general question of the type of construction program that should be adopted for the months ahead.

Naturally, the construction requirements of different companies will vary, but in general it would seem that due to the limiting factors of material and labor shortages, the 1945 construction program will necessarily need to be along repair rather than complete overhaul or replacement lines.

A visit with your supplier should give you a good lead as to what you can expect in the way of deliveries on various types of material and thus enable you to plan your construction program accordingly.

There is certainly no advantage in starting a large construction project unless you are reasonably certain that you will have both sufficient manpower and supplies to complete it.

If you find that either material or manpower shortages will prevent large scale projects, a good plan would be to make spot repairs which will fit into future reconstruction or overhaul plans. For example, bad corners can be rebuilt, weak terminal poles replaced, needed transpositions cut in, etc.

This article discusses various phases of outside plant construction which lend themselves to spot repair as suggested above.

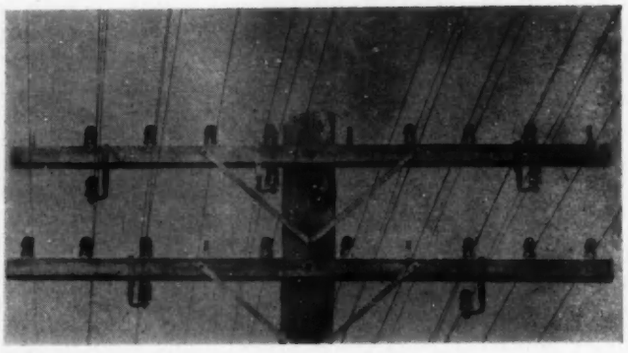


Fig. 3 — Neatly cut in physical transpositions.

Noise and Crosstalk

NOISE and crosstalk levels are often excessive in some of the smaller Independent plants even though the open wire lines are of the metallic type. A campaign to improve transmission by a reduction of crosstalk and inducted noise will in many cases produce surprisingly good results.

Crosstalk and noise may be due to any one or all of the following factors:

(1)—Low insulation resistance in cable due to sheath openings,

(2)—Tree grounds in the open wire section of line, or grounds in subscriber's equipment (Fig. 1),

(3)—Inadequate transpositions in open wire lines.

Grounded or partially grounded cable and open wire lines can readily be located by insulation resistance measurements. Open wire line should show an insulation resistance of from 5 to 10 megohms per mile, and cable pairs with the open wire line disconnected should show virtually no leakage at all considering the short lengths normally involved. Typical sources of grounds on rural lines are: (1) tree growth, (2) charred bushings in the generator shunt spring assembly, (3) dirty protector blocks, (4) leaks in underground railroad crossings, etc. Any of these sources of trouble can readily be located by the use of a portable ohmmeter.

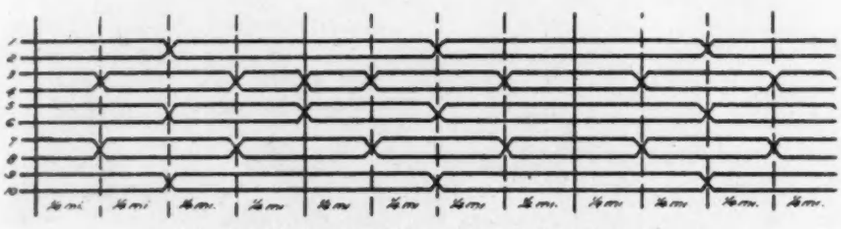


Fig. 2—Simplified transposition scheme for ten wires or less.

Transposition Requirements

WHENEVER metallic telephone lines parallel each other or a high voltage power line for more than a quarter of a mile, they should be

transposed if crosstalk and noise are to be kept to a low level.

A transposition scheme of simple design is shown in Fig. 2. This scheme is suitable for rural and minor toll circuits and requires fewer transpositions than the **exposed line transposition schemes** used on multi-crossarm leads. It will provide a good crosstalk and noise balance for the lengths in which it would normally be used.

The use of compression type splices makes the matter of cutting in transpositions a simple process. A neat job of cutting in physical transpositions is shown in Fig. 3. The use of metal drop brackets is preferred to two-piece transposition glass and nine-inch pins.

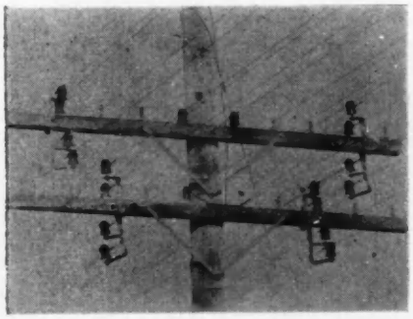


Fig. 4—Phantom transposed circuits.

Phantom transpositions are somewhat more difficult to handle than the physical type but are essential if phantomed lines are to be operated successfully. A closeup of a phantom transposition is shown in Fig. 4.

Reconstruction of Corners

THE corner pole is an important part of a telephone lead. If improperly constructed, it may be a constant source of trouble. Poor construction shows up in the form of anchors slacking off, high resistance jumper connections, arms pulled out out of line, etc. If a pole lead is to be completely rebuilt as soon as supplies are available and is to occupy the same relative position as at present, now is a good time to rebuild the corners. This would not involve substantial expenditures of material and can probably be more economically handled at this time with a small crew than later when a complete rebuilding program may be in progress.

When possible, corners should be made on several poles rather than on single poles using buck arm construction. Fig. 5 shows a properly constructed corner using several poles and with the wires all under tension. The anchor location should be carefully selected so that each anchor bisects the **angle of pull.** The pole should be given a slight rake in the direction of the anchors. Where it is impracticable to install a multi-pole corner, buck arm construction should be used and all jumper connections neatly run. The use of the special compression type sleeves now available enables jumpers to be placed with assurance that they will offer a secure low resistance connection. The anchors for corner poles of the buck arm type should be thoroughly "pulled" before the strand is made up as otherwise the pole may be driven deeper in the hole or the anchor may give sufficiently to throw the slack into the line and permit the pole to lean in the direction of the line wire pull. Where pine poles are used at corners, care should be taken to select poles with butts of ample size to minimize settling in the hole.

Tree Trimming

MANY companies have no annual tree trimming program and trim trees only when they become so bad as to result in substantial line leakage or cause line trouble such as shorts and crosses. This practice, while possibly more economical than a periodic or annual trimming of trees along open wire routes, results in a lower grade of service and frequent service interruptions. If labor can be procured, now would be a good time to go over all leads and trim the trees in such manner that, whenever possible, permanent clearance is obtained. In many instances trees growing directly beneath telephone leads contribute little from an appearance standpoint to adjoining farm land and permission (if required) can often be obtained to remove them completely. (Fig. 6). In many instances, the cost of complete removal of brush and trees is less than the cost of superficial trimming to provide clearance.

Fig. 6—Now is the time to get rid of this future, trimming headache.

Get Them While They Are Young

WHEN inspecting rural leads to determine the amount of trimming required, do not overlook small trees and sprouts from old stumps which are located directly underneath

Fig. 5—Well constructed multi-pole corner.

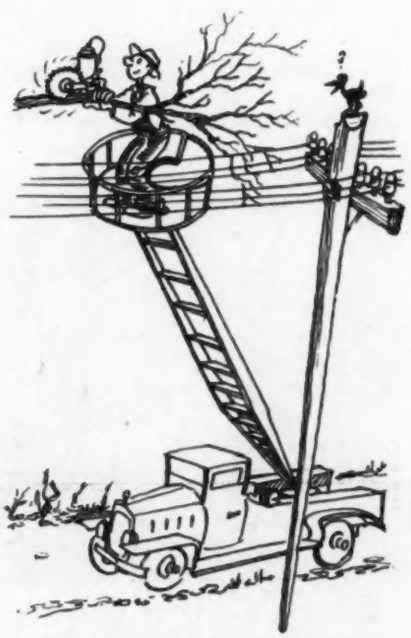


Fig. 7—How about a Crow's Nest to cut tree trimming costs?

Cable Plant Construction Often Neglected

Illustrating the use of alley arm to support cable for better tree clearance.

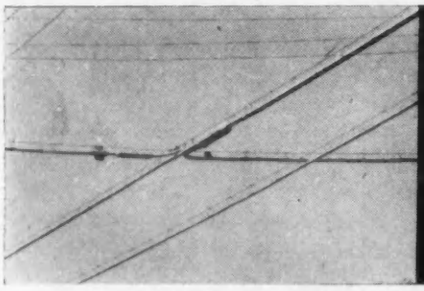
A careful inspection and overhaul of the cable plant should pay dividends in the form of extended life and freedom from service interruption. Even though a major replacement of a section of cable is contemplated at some subsequent time, there are many repairs that can be effected now which can be made to fit into any subsequent replacement of defective or congested cable. The illustrations which are shown here stress various features of cable plant construction which are often neglected in the smaller exchanges.

When inadequate tree clearance for aerial cable, at least protect it with wood molding.

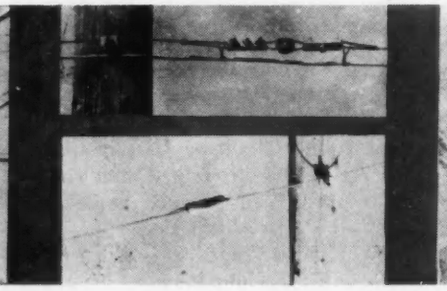
Handy cable guide for cables up to and including 100 pair. (Designed by Ray Bolling.)

This was a job for a 25 pair cable not drop wire.

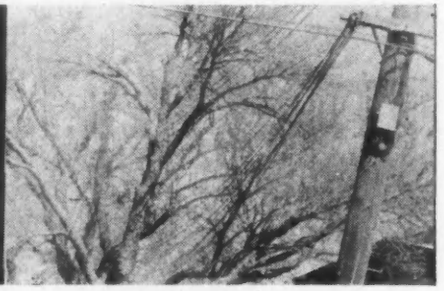
Building cable will save time and money where more than five subscribers are located in the same building.



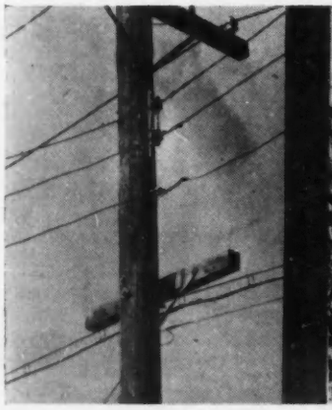
Picturing well made aerial cable turn.



Comparison of new patented type strand connector with old type strand splice.

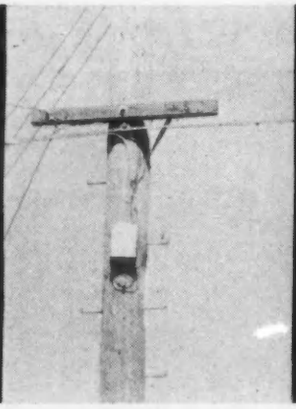


One terminal per block is not enough.

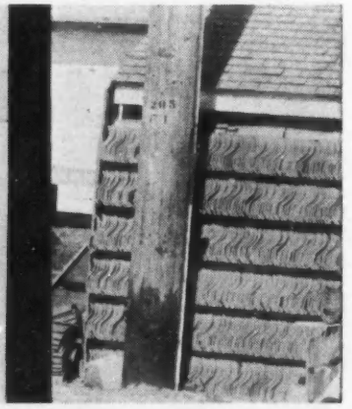


Eliminate danger like this by adequate clearance between power and telephone wires.

This is the kind of clearance that counts.



An example of neat cable terminal installation.



Terminal poles should be properly designated as illustrated on the pole above.

Fig. 8—Why not a motor driven saw to speed up trimming?

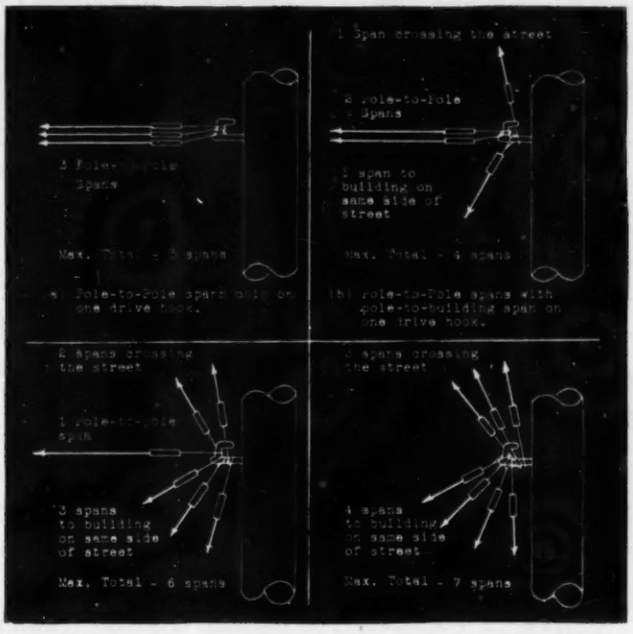

1 Span crossing the street
2 pole-to-pole spans
1 span to building on same side of street
Max. Total - 4 spans
4 spans crossing the street
1 pole-to-pole span
3 spans to building on same side of street
Max. Total - 6 spans
6 spans crossing the street
1 span to building on same side of street
Max. Total - 7 spans

Fig. 10—Convenience of drop wire hooks and clamps.

the telephone wires as they constitute a potential source of future trouble. In many instances, farmers can readily be induced to give permission for the removal of small trees and sprouts at this time but might object strenuously to complete removal after the trees are of such size as to constitute a source of interference to telephone wires.

New Ideas for Tree Trimming

IN a recent discussion with a plant manager, I learned that tree trimming expense is, considering the present high cost of labor, a real problem. Inasmuch as we can expect trees to continue to grow with the same vigor as in the past and labor costs will certainly not become any less, it seems certain that we will need to introduce new methods and practices that will expedite tree trimming operations. Several ideas on possible solutions for lower costs are: (1) the use of walk-up truck-mounted extension ladders with a work platform or crow's nest on top to enable linemen to easily get up into the tree where limbs can be more quickly removed without the time consuming laborious operation of attempting to either climb the tree or perform the operation from the ground. (Fig. 7), (2) the use of some type of light weight high speed motor-driven small blade circular saw which can be operated from the ground by one or two men and which would permit larger limbs to be removed in a fraction of the time now required by hand. (The power source could be a small gasoline driven generator such as is used for hole digging operations with the portable type digger.) (Fig. 8), (3) the use of motor driven military type chain saws for removing large trees and brush from directly beneath the telephone line quickly. (Fig. 9).

Tools which have heretofore seemed relatively expensive in relationship to the amount of use for them may now offer outright economy and savings as a result of the high cost of labor.

Drop Wire Plant

THE critical shortage of drop wire makes it imperative that the life of existing drop wire be lengthened as much as possible even though the repair practices would normally be considered uneconomical. The treatment of badly-worn drop wire with an asphaltic compound either in place or in the shop is one method currently used to extend drop wire life.

More attention to the prompt removal of sources of abrasive action on drop wire represents another way in which existing drops may be continued in service with a minimum of trouble. Drops rubbing on buildings and in the trees should be given a corrective treatment. This may require rerouting, minor tree trimming or the use of additional drop wire supports on buildings.

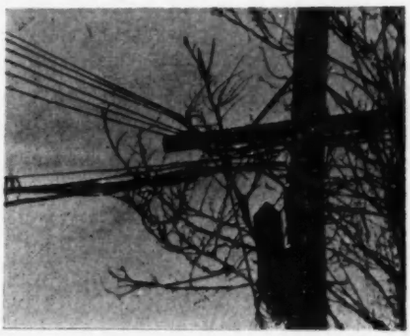


Fig. 10-A—Cluttered up appearance of terminal pole due to use of old type drop wire supports.

Many drops are satisfactory in the span but have deteriorated at the pole due to faulty ties. The life of such drops can be extended by splicing in a short section at the pole and rearranging the wiring into the terminal. Genuine improvement in the appearance of terminal poles which carry

(Please turn to page 107)

Fig. 9—An army chain saw should make light work of heavy trimming jobs.

Conducted by the
Observer and his Gang

THE Observation Tower

If you have observations or even a friendly bit of argument suitable for use in this column, you are invited to send them along, which automatically makes you a member of the Gang. You will be anonymous—no names of telephone people or telephone companies are used in this column. Address "The Observer," in care of TELEPHONE ENGINEER AND MANAGEMENT.

Obsolescence'll Get You If You Don't Watch Out!

THE Editor let us read his editorial for this issue, and we think he said a mouthful about obsolescence.

The biggest and costliest item a large part of the telephone industry will have to face during a number of years after the war will be the factor of obsolescence. As the Editor says, this will be the greatest period of what might be called "realized obsolescence" this country has ever experienced.

Obsolescence has always been one factor in the cost of depreciation. Now it will likely be the largest factor of that cost for some years.

We get some perspective on this situation when we think of the millions upon millions of dollars worth of prewar things that now exist and are now being used in this country, and that will be thrown overboard as soon as new and more modern things are available to replace them.

Take the item of radio receiving sets alone. It is reported that one confidential survey made by the radio set producing industry indicates an immediate postwar demand for around 25,000,000 new and modern radio receivers. One large company in the industry predicts a postwar market for at least 60,000,000 new radio sets—enough to keep the producing industry going full blast for about six years.

Remember that most of these new radios will replace radio sets now in use; sets that will be made entirely obsolete by the new postwar radios.

That will be the realization of obsolescence on a grand scale. And that is only one item. What about automobiles, refrigerators, electrical appliances of all kinds and a myriad of other things that will become obsolete the moment the new and more modern successors to them are offered for sale?

That the telephone industry will have to take its share of this vast amount of realized obsolescence, goes without saying. And we agree with the Editor that, in the telephone industry, it will be the small Independent companies that will have to take a large part of the rap.

The American public, by and large, has always wanted and been willing to pay for, the best and most up-to-date of everything. That characteristic will be greatly stimulated by the hundreds of new things that will come out of this war and will be made available for postwar public use.

We think that antiquated telephone service, in town or on the farm, will not satisfy the public after the war. We think modernization will be just as necessary in the telephone industry as in the many other places. We think the owners of small telephone companies should prepare to modernize their plant and service as soon as possible after the war—and we agree with the Editor that, if they do modernize, they will make more money than they ever made in normal times before.

Old Man Obsolescence is on our trail—and he'll get us if we don't watch out!

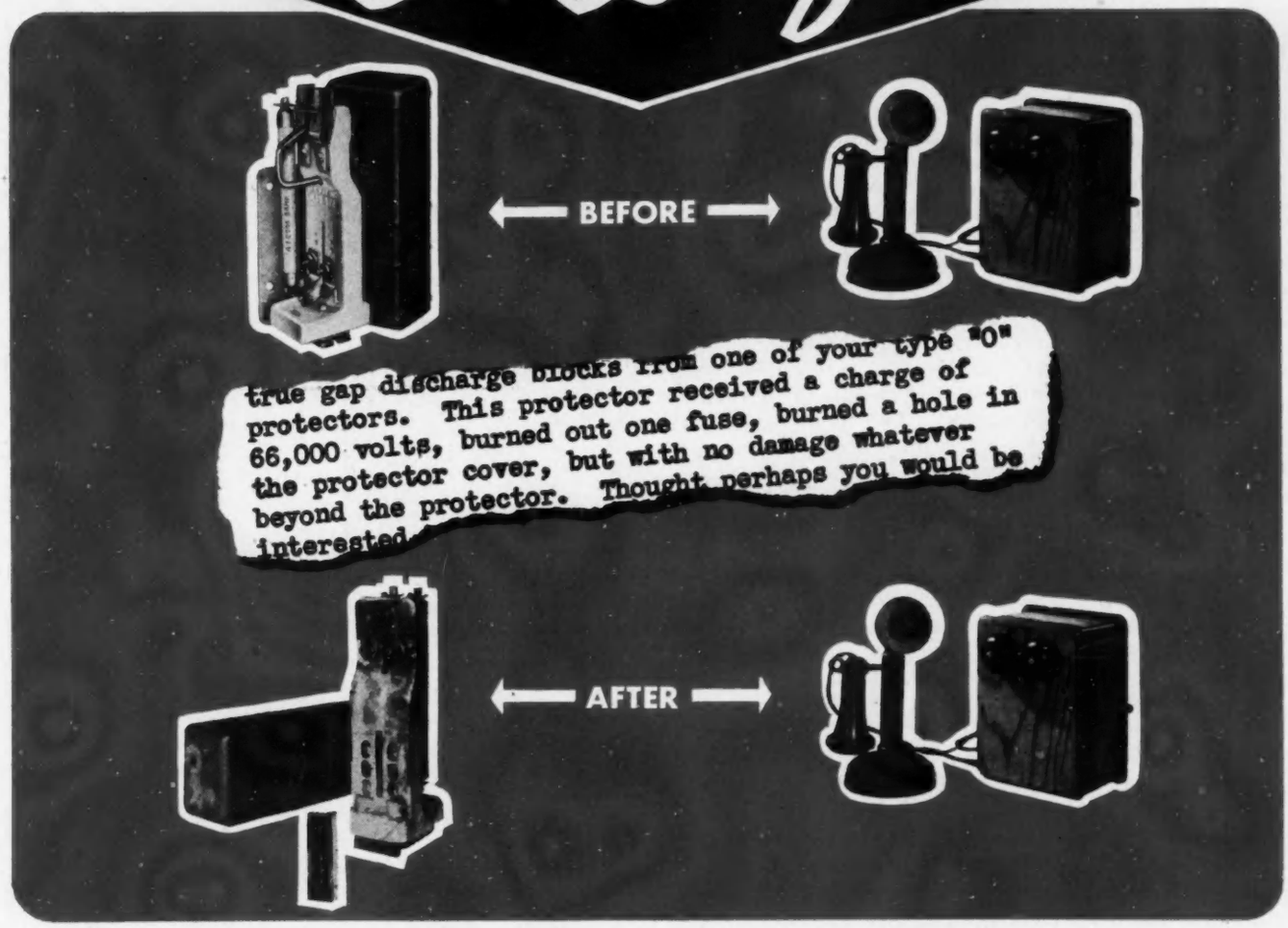
"Say It With Charts"

THANKS to Gangster No. 178, we're now in position to study the art of making charts of businesses. He tipped us off to a book on the subject with the name "Graphic Methods For Presenting Business Statistics."

We got a copy of the book and looked it over carefully. It's pretty deep, and we haven't dived into it with full vim and vigor yet, but we've got it on our calendar for study and report.

When we've mastered this book we'll tell you something more about the proposition of presenting business statistics with graphic charts.

PERFORMANCE IS *Proof*


BEFORE
true gap discharge blocks from one of your type "O" protectors. This protector received a charge of 66,000 volts, burned out one fuse, burned a hole in the protector cover, but with no damage whatever beyond the protector. Thought perhaps you would be interested
AFTER

Above is reproduced a portion of another enthusiastic letter approving the dependability of Cook protection through performance.

We asked the writer of this letter, Mr. Carl O. Morgan, of the Argos Telephone Company, Argos, Indiana, to send us photographs of the protector and instrument. We believe these pictures speak for themselves.

COOK ELECTRIC Company

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Postwar Planning

GANG member No. 203 is champing at the bit on the subject of postwar planning for the telephone industry. He says the big shots down in Washington put the lid on discussion of the subject when they got scared during the German counter-attack in December, but they couldn't stop him from thinking.

He gave us a piece to read that he had clipped from a magazine, which has the title "Factories Can't Employ Everybody." The theme of it is that the postwar planners who make the surveys about what everybody is going to want to buy after the war and how many people will be employed after the war, never pay any attention to such things as services, such as telephone service. All they take into account is things that are manufactured in factories.

We checked up on the proposition, and this author turned out to be right.

We studied reports put out by a number of postwar planning committees for various organizations. They have done a lot of work in figuring out how many new things of various kinds people are going to want after the war.

They have checked up, for instance, on vacuum cleaners, clocks, radios, refrigerators, washing machines, electric irons and a score of other things of the kind—all made in factories.

But none of them, so far as we can find, have attempted to find out what the postwar market is going to be for such things as transportation, hotel rooms, laundry service, newspapers and magazines, advertising and other things of the kind—not manufactured in factories—including telephone service.

The author of the article to which we have referred says this is all wrong—as of course it is. He points out that all this fuss about the number of people who will be employed in postwar manufacturing is only a part of the story. He says it is, in fact, the smaller part of the story, and that as far back as 1930 only about 31% of employed people were employed in manufacturing enterprises, while more than 47% were employed in the various kinds of service businesses, which include the telephone business.

So why, says Gang Member No. 203, don't some of these long-haired postwar surveyors get wise to where a lot of the employment really is, and make a postwar study of the service industries of the country?

Why, for instance, when they are trotting around asking people how many waffle irons they're going to need after the war, don't they also ask them if they are going to want telephone service?

Well, we can't answer that. We don't even want to get ourselves into the position of trying to figure out why these economists do, or don't do, anything. Sometimes we wonder if they know themselves.

All we can conclude about the whole proposition is that if the telephone industry wants to know how many people expect to want telephones after the war, it will have to find out for itself.

But somebody should tell these economist gentlemen that there are businesses in the United States, and businesses that employ people, that are not manufacturing businesses.

We're Sticking Our Neck Out

WE try to avoid controversial subjects in this column, especially at this time of the year. We want to be able to use the long and so-called lazy summer days that are coming, for something more pleasant than fighting.

However, we can't keep our minds off of this provocative issue of farm telephones, about which so many meetings are now being held, so many reports being made, and so many resolutions passed.

One thing we are wondering about this farm telephone issue is whether the object of the telephone industry's affection, the farmer himself, is heated up on the question nearly as much as the industry is.

We doubt very much if he is. A lot of farmers have been getting along for some time without a telephone. Most of those farmers seem to be prepared to get along without telephones in the future too.

It seems to us that there is something to this farm telephone question besides passing or fighting bills or holding meetings and adopting resolutions, getting up statistics, and so on.

That something, we think, is the attitude of the farmer himself about telephones on the farm.

We think there should be telephones on farms—a telephone, in fact, on every farm that can be reached by now known practical and economic methods of providing farm telephone service.

But we also think that somebody has got to do a real job selling telephone service to farmers, in order to put telephones on most of the farms that do not have them now.

Of course, if a Rural Telephone Administration is created, it will take on the selling job. But if it is not created, the telephone industry itself will have to take on that job, if telephones are to go on to farms in large numbers.

Maybe we're wrong. In fact, we don't really know anything about the farm telephone problem. We get most of our information about agricultural matters from one farmer we know, and that's not a very high percentage of the 4,000,000 or so farmers in the United States.

Our farmer friend says he wouldn't have a dad-gummed telephone in his house on a bet. Said he had one once, but every time the pesky thing rung—and it was ringing most of the time, with fourteen people on the line—his wife dropped everything she was doing and scurried out to the front hall and glued the receiver to her ear.

He darn near had to hire a cook, he said, to be able to get anything to eat while he had a telephone.

He admitted, on prodding, that a telephone was a pretty handy thing to have on the premises. Said he'd probably have one if he could get the kind his cousin Jim had in town—one that rung only when it was you they wanted, and one you didn't have to crank to get Central. But the telephone company didn't seem to have that kind of telephone in stock for farmers, and he'd be darned if he'd ever have one of them old-style 'phones that rings all the time.

So maybe a part of the job of selling telephone service to farms is the proposition of having something to sell that he might be willing to buy.

A Literary Matter

STOP reading if you've heard this one: A goofy sort of a fellow kept pestering the town library for mystery books. Every day he would call, borrow a mystery book, take it home, and return it the next day and take out another one.

Finally he had read the library out of mystery stories, and he began to get rambunctious about it.

"He's a nut," said the head librarian. "He never knows what he's reading anyway. Give him the Chicago telephone directory."

The goof, satisfied, took the directory home with him. When he returned it the next day, the librarian asked him how he liked it.

"Well," said the nut, "there ain't much plot to it—but it's sure got a great cast of characters."

FCC Authorizes A.T.&T., Southwestern Bell, $962,400 Toll Project

The FCC has granted the American Telephone and Telegraph Co. and Southwestern Bell Telephone Co. authority to supplement existing facilities between Chicago, Ill., Houston, Texas, and other points at an estimated cost of $962,400. The new construction will provide for the 1945 requirements of 119 additional channels totaling approximately 44,600 channel miles.

Construction of facilities between Holdenville, Okla., and Dallas, Texas, will involve 10 sections, each about 7 miles in length, of toll cable containing 16 quads of 19 gauge conductors for a total distance of about 70 miles. Equipment for construction of facilities between Chicago, Ill. and Houston, Texas will comprise 11 "K" and 11 "EB" carrier systems.

A.T.&T. was given authority at the same time to supplement its existing facilities along the New York-Boston cable routes at an estimated cost of $729,300. Proposed carrier systems, operated over conductors and existing cables, will provide for 246 telephone channels, to meet the estimated requirements. Both "K" and "EB" type carriers will be used, with a total of 16 "K" type and 54 "EB" systems.

AAF Takes Over Communications Procurement

The responsibility for procurement, inspection and storage and issue of communications equipment, wire and radio, peculiar to the Army Air Forces was transferred April 1 from the Signal Corps to the Army Air Forces with all funds, functions, personnel, equipment, facilities and records of the Signal Corps used in this work being shifted to the AAF.

The total personnel involved in the transfer was 6,277, including 344 officers, 157 enlisted men and 5,776 civilian employees. The Dayton Signal Corps Supply Agency comprised the largest group with a total force of 3,551 and the Signal Corps Inspection Agency with 2,043 was the second largest staff transferred.

New Corporation

The Potter (Nebr.) Telephone Line Co. filed notice of incorporation recently and will purchase, erect and operate telephone lines in Cheyenne County. The incorporators are Donald E. Erickson, A. M. Scafdale, Theodore Carlson, William Benish and Ernest Baack.

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All types of "60" series paystations are in stock—ready for immediate delivery. See them in our complete Paystation Catalog No. 4078—sent promptly on request.

Utilities Order U-2, the regulation that limits the installation of public telephones, specifically provides for "essential public paystations", and the use of wiring materials required in connection with their installation. For such installations, telephone companies are permitted to use the AA-1 preference rating granted by Utilities Order U-3 for maintenance, repair and operating supplies.

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Thinking of Maintenance?

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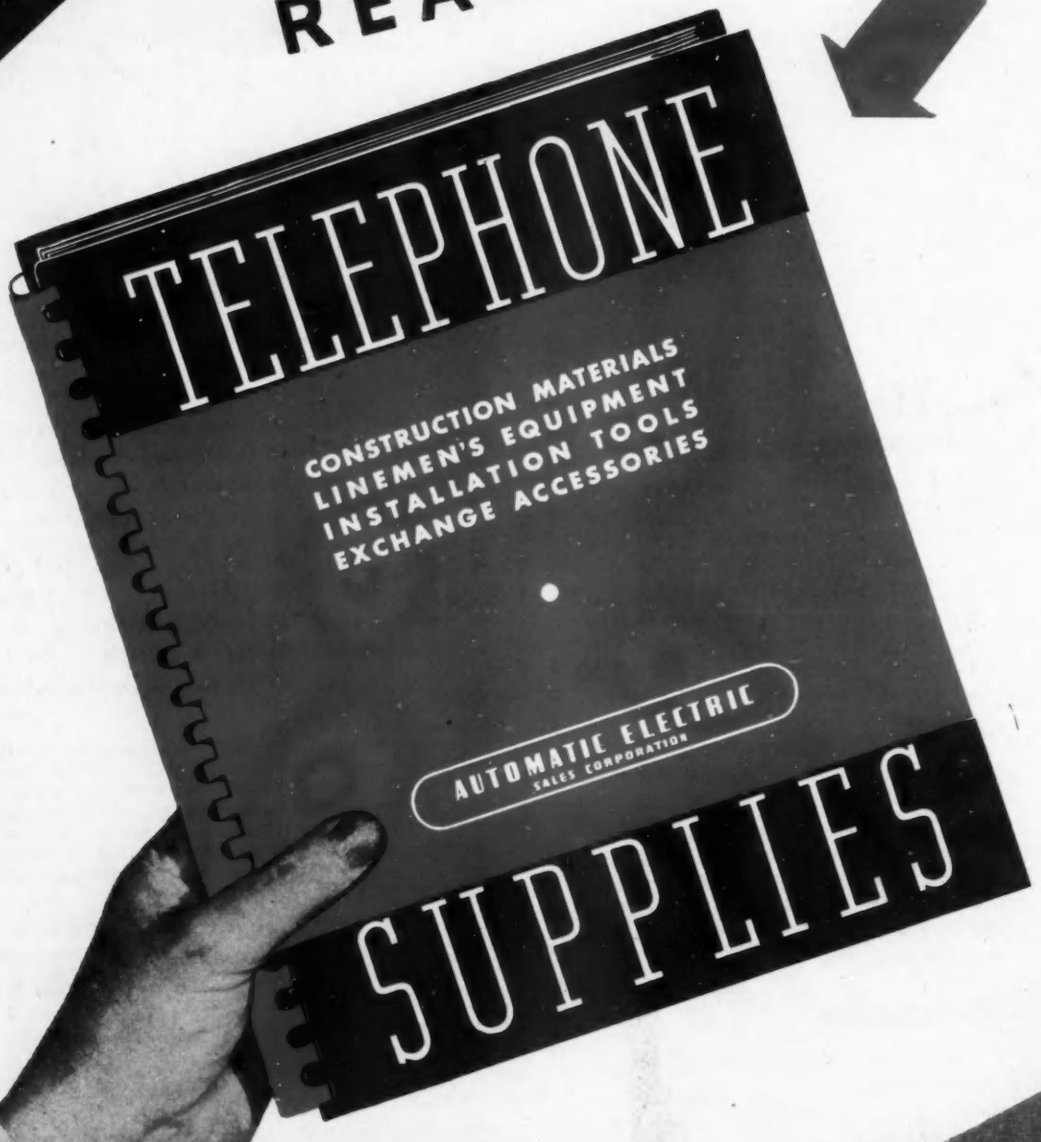

his Big Book

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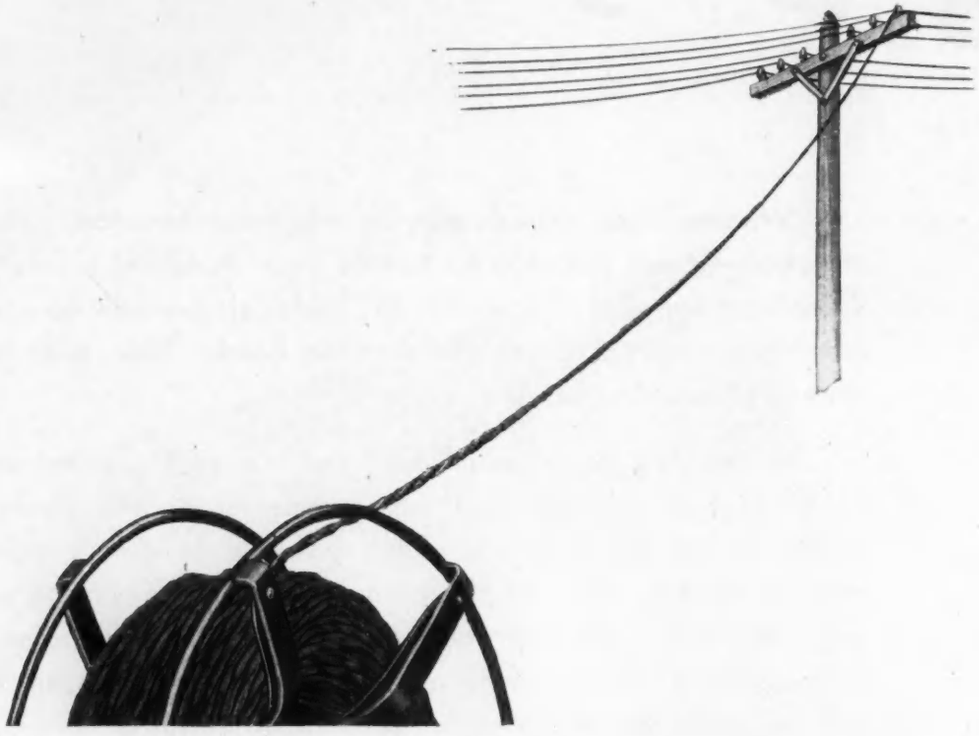

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Highlights of the Communications News

Important Communications developments of the past month, briefed for busy readers

by
ROLAND C. DAVIES
Editor, Telecommunications Reports

THE V-E "green light" of reconversion will come for the telephone industry ahead of other industries—as it is grouped by the Washington planners in the essential services which must be restored first to pre-war normalcy—and not only substantially increased civilian equipment production may be authorized but also relaxation of controls over the flow of materials and installation of facilities will be allowed before the formal surrender of Germany.

On another front, the telephone industry received encouragement, if not assurance, that there would be no legislation forthcoming out of the present Congress to fuse the overseas radiotelephone facilities of the American Telephone & Telegraph Co. into the proposed merger of the United States international communications facilities and at the same time the telephone service, both in its domestic and overseas operations, received the highest sort of praise from all sides, both from Senators and from leading government officials.

These were the two major developments in April for the telephone industry in the governmental "mill" in Washington. As this month winds up, they promise to produce beneficial results for our industry in the field of reconversion. (Details of the "Victory" planning for our industry are carried later in this column.) In the case of the A.T.&T.'s overseas telephone service not only is the decision to keep it out of a complete consolidation most beneficial to the telephone industry as a whole but also during the later hearings the world superiority of the telephone service in this country will be fully depicted to the Senate Committee and government agencies. (Summary of Senate Subcommittee hearings up to present time is in another portion of this column.)

Rural Telephone Legislation At Standstill

THE Rural Telephone Administration bill is at a complete standstill and there appear no prospects for either the Senate or the House Committee taking up this legislation for months. This outlook was supported by the projected departure of Senator Hill of Alabama, main sponsor of the bill, to go overseas with a Subcommittee of the Senate Military Affairs Committee to observe the European war situation and to discuss with General Eisenhower and his chief aides the policies on the future German occupation. Such a trip would take the Alabama Senator away from Congress for a couple of months. Then will come the summer recess, or at least a letdown for Congress, so the telephone industry might consider that committee study of the bills cannot in all probability come until fall, if then.

Independents Face Wage Increases

Independent Telephone companies must face the realization that the trend of wages is upward and that their wage scales will have to come closer to the pay levels of the Bell System. At least, the Independents' wage rates must keep pace with increases in Bell companies in the same ratio as before Pearl Harbor.

The National Telephone Panel recently gave the tipoff of what is in the wind—out of 26 recent Form 10 (voluntary wage increases embodying support of both company and employee labor organization) wage adjustments, nineteen involved Independent companies. The Independents which had their Form 10 cases approved by the Panel and by the National War Labor Board were the Ohio Associated Telephone Co.; Ohio Standard Telephone Co.; Warren, O., Telephone Co.; Southwestern States Telephone Co.; Sullivan, Ind., Telephone, Co.; South Carolina Continental Telephone Co. (Sumter, S. C.); Mankato Citizens (Minn.) Telephone Co.; Palestine, Texas, Telephone Co.; Lexington, Ky., Telephone Co.; Ozark Central (Mo.) Telephone Co.; East Coast Telephone, Inc. (Fla.); and Delta County (Miss.) Cooperative Telephone Co. Both the Ohio Associated Telephone Co. and the Central Telephone Co. (formerly Central Electric and Telephone Co.) had Form 10 adjustments covering several departments of their companies.

The Independent industry has designated a new substitute member for the industry on the National Telephone Panel—Burton W. Saunders, vice president of the Indiana Associated Telephone Co., takes the place of Mr. Brorein, who had to give up his assignment as alternate member because of pressure of other affairs.

OPA to Decide Soon on Telephone Rate Advisory Committee

THE OPA Public Utilities Division expects to complete the membership and organization plans of the projected advisory committee on telephone rate matters and to have that body in operation by the end of April. The makeup of the committee may be entirely of representatives of the Independent industry, although some consideration was given to having a certain number of Bell System representatives.

Early April was a busy time for OPA intervention in the application of Independent companies for increased rates. The OPA Utilities Division was intervening in four Minnesota Commission hearings on rate increases of the Washington County Rural Telephone Co., Farmers Telephone Co., Kasson and Manterville Telephone Co. and United Telephone Co. and in Michigan opposing rate increases of the Citizens Telephone Co. of Darien and the Baroda Telephone Co.

Additional Civilian Telephone Manufacturing Slated in Near Future

PERMISSION from the WPB for additional production of civilian central office equipment, cables and telephone instruments by the telephone manufacturing industry is slated to be forthcoming in the near future, even before any V-E Day pronouncement. This was an indication of the new well defined outlook that the telephone industry will get a "go ahead" signal for reconversion in the vanguard of other industries.

Because of the changing war situation and the likelihood of a European victory announcement at any time, the

WPB Communications Division has been waiting until the last moment possible for the formulation and distribution of the agenda for the next Telephone Operations Industry Advisory Committee meeting, set for April 19.

At this meeting, it is felt that consideration of substantial revisions of the limitation and control orders which have been in effect for the telephone industry during the war will come up as a No. 1 topic of discussion. Undoubtedly, the good fortunes of the Allied forces on the battlefronts have also dissipated the threat of a plan of recapture of residence extension telephones; and if any such move is to be brought up at the Advisory Committee session, it will probably be recommended that such a step should be only on a voluntary basis and not a mandatory recapture.

Steel Requirements

IN the last lap of military production, there has risen the important factor of substantially increased military requirements for steel in the second quarter of this year which have reduced the amount of steel available for non-military use below quantities previously estimated for civilian allotment. WPB Communications Division Director Leighton H. Peebles recently advised the telephone industry about this situation in an administrative letter:

> While no formal restrictions have been placed on MRO purchases by operating communications companies, you are urged to defer or reduce to the fullest extent second quarter orders for steel placed under authority of Utilities Orders U-3 or U-4. Orders for steel wire and strand in particular should be deferred to third quarter delivery whenever this can be done without serious interference with service. Furthermore, in view of the present critical steel situation, you are urged to defer deliveries of steel for plant additions authorized on Form WPB-2774 wherever this can be done without jeopardizing the completion of urgent projects on schedule.

However, after V-E Day, the steel tightness will clear up and WPB Chairman Krug noted that the military services will release one and a half million tons of steel in the first quarter after V-E and then in the second quarter after victory another million tons are to be released.

Positive Assistance Promised

IN regard to the reconversion situation, WPB Chairman Krug emphasized that essential civilian services, railroads, public utilities and communications, will be given preferred treatment in the relaxation of controls over critical war materials and will be given "positive assistance" by the WPB in obtaining controlled materials, allotments and preference ratings for new or additional civilian production of equipment and facilities in short supply. It was likewise understood that the military services had withdrawn previous objections to increased allocations of materials for telephone civilian production in a recent determination of such allotments for the second quarter and the list of additional civilian production items for the telephone industry will be set up soon.

"Definitely civilian radios will be out by the end of the year," WPB Chairman Krug also stated in his discussion of the reconversion planning this week. It is well known that the Administration planners, including Justice Byrnes, are interested in the potentialities of FM and television in postwar employment. Chairman Krug stated that preference in homefront consumer durable articles for allocation of raw materials after V-E Day will include radio sets, but the first call will be for railroad, public utility equipment, oil drilling tools and farm machinery. Radios headed the consumer durable goods which was next on the preference list.

Cutbacks More Gradual

Chairman Krug of the WPB pointed out that military cutbacks will be more gradual than those projected last summer, and it may be that the cutbacks will not reach a stage of more than 40% one year after V-E Day. Military equipment, now being produced for delivery to Europe next fall, he noted, is to be sent to the Pacific theatre.

The CMP shortly after V-E Day will be "open ended" to reserve materials for essential programs (which will undoubtedly include public utilities and communications), the WPB has announced.

Civilian Telephone Production

THE manpower situation at the St. Paul Western Electric plant for manufarturing civilian telephone instruments is still tight, although some relief may be in sight in the reduced ordnance manufacturing in that area. This may be soon cleared by the Selective Service decision to confine drafts to 18-year-olds. The Army took a big bite of sets away from civilians from this Western Electric plant during the 1945 first quarter for its telephone requirements in the South Pacific so that the plant fell short of its quota. Due to military schedules none of the Independent manufacturing companies had been able to produce their quotas during the first quarter.

Outlook on International Merger Recommendation

UNLESS all signs fail, the prospects for a legislative recommendation for a merger of all the American international communications companies by the Senate Interstate Commerce Committee are nil. **In fact, the farthest the Senate Committee is expected to go will be a voluntary or permissive merger bill recommendation with the A.T.&T. radiotelephone system and Press Wireless excluded and probably permissive merger for only the cables and radiotelegraphs in separate companies.**

This was the outlook after three weeks of hearings by a Senate Interstate Commerce Subcommittee, which produced a sharp division of views by the interested government agencies. Actually the whole inquiry might result in no legislative recommendation for any sort of a consolidation, and the Senate Subcommittee might decide that the best pattern for the United States after the war in international communications might be the establishment of a national telecommunication policy committee or board which would transmit to the operating companies the views of the government on the establishment of circuits and extensions of service as well as keeping a check on the allocation and use of frequencies.

The international communications companies—A.T.&T., Western Union, Press Wireless, RCA Communications, the I.T.&T. cable companies and Mackay Radio, Tropical Radiotelegraph, and Globe Wireless—are slated to present their positions before the Subcommittee during the latter part of April. Out of their testimony may be evolved a pattern for a partial consolidation on a permissive basis. One of the goals of the projected merger is the divestment of the Western Union cables, which was a provision of the statute permitting Western Union's acquisition of Postal Telegraph and the establishment of a single domestic telegraph company.

Coffin for Navy Plan

THE Navy Department's proposal for a complete unification of all international communications services on a mandatory basis with a fourth of the directors to be government representatives was felt to have been nailed in a coffin as a result of the opposition of the State Department and War Department, together with the Civil Aeronautics Administration,

which opposed the inclusion of the overseas telephone services. Besides creating a giant monopoly with private operation but government supervision through the five government directors, the Navy plan was regarded as the opening wedge for eventual complete government ownership and operation of international communications—and this government ownership threat might well lead to invasion by the government into the domestic communication fields, it was feared.

Assistant Secretary of State Will L. Clayton hammered down the nails in the coffin with his department's position that it opposed a complete or partial merger and, if any consolidation is undertaken, the State Department hopes it will be limited in order to permit competition between the different kinds of service—cables, radiotelegraphs, telephone and Press Wireless. Previously, the War Department through Major General Harry C. Ingles, Chief Signal Officer of the Army, emphasized that any international communications merger should be voluntary and that there were fundamental differences between military and commercial communications. He indicated definitely that the War Department wanted the telephone kept out of a consolidation. CAA Deputy Administrator Charles I. Stanton declared that this government agency is not convinced of the need for a complete merger into a single company and that it should not go beyond a merger of all record-type communications into one and a merger of voice-type communications into another separate competing organization. Both he and Brigadier General Harold M. McClelland, AAF Air Communications Officer, emphasized that aeronautical navigation and safety communications must be entirely excluded from any consolidation.

Because of reports of previous support of an international merger by the State Department, the backing of continued competition in overseas communications came as a bombshell. Senate Subcommittee Chairman Wheeler immediately commented on the changed viewpoint and noted that representatives of the State Department had previously advocated a merger and that the White House had backed such a move. Both Senator Wheeler and Senator McFarland emphasized that the investigation by the Senate committee had been undertaken at the insistence of the State Department and even the White House.

Assistant Secretary Clayton stressed in his statement that the U. S. has leadership in the vitally important field of long distance telecommunications and its pre-eminence should not be jeopardized. The view of the State Department, he said, was that on the basis of present experience and the evidence at hand a complete merger of international telecommunications facilities "is inadvisable." There is as yet no evidence that a merger is the means best calculated to protect U. S. national security and to promote the general welfare of the American people. The burden of proof, he added, is upon those who would substitute monopoly for the traditional American competitive system in any field where we have risen to pre-eminence.

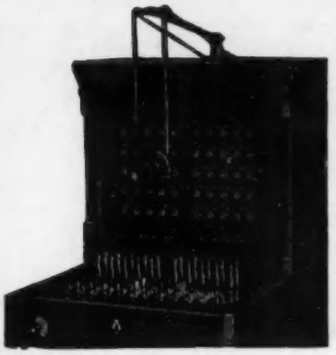
U. S. Has Best Telephone Service

HIGHLIGHTS of Assistant Secretary Clayton's statement included these:

1. He suggested that a merger radiotelegraph company, performing its own pick-up and delivery service, and a merged cable company might operate to the public benefit.

2. When the U.S. has the best telephone service in the world, Mr. Clayton said it seemed to him "a decidedly unattractive risk to put it into a common pot with the other services." The State Department, he emphasized, would retain competition between the wire services, radiotelegraphy and radiotelephone and "would seriously

(Please turn to page 81)



Maintain Those Keys, Drops, and Jacks

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THE AUTHOR

MAINTENANCE *of the Central Office* BATTERY ... by J. S. Reed, Jr.

Part II, Conclusion

Methods of Charging the Central Office Battery

Storage batteries are charged by several different methods as follows: (1) charge-discharge, (2) continuous float, (3) charge-discharge and float, (4) trickle charge, and (5) voltage controlled charge.

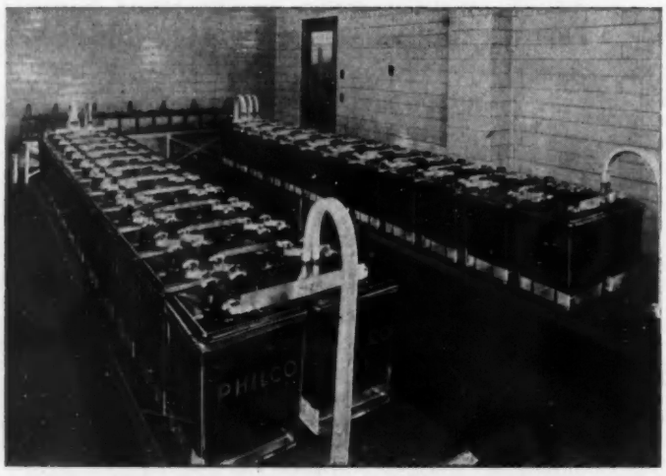
The **charge-discharge** method consists of charging the storage battery to nearly its maximum capacity and then allowing it to discharge into the exchange load until a predetermined capacity minimum is reached before repeating the charging process. The battery is charged as often as necessary to keep its specific gravity from dropping below the limit set for it.

In the **continuous float** method, the battery and charging equipment are permanently connected across the mains with the charger output regulated to equal the discharge load plus losses in the battery. Manual correction is made at hourly or half-hourly intervals to maintain an average of 2.15 volts per cell with a maximum variation of .05 volt either way (from 2.10 to 2.20 volts).

The **charge-discharge and float** is really a combination of the two foregoing described charging methods. The charging procedure is as follows: After the battery is fully charged, it is allowed to remain on charge during part of the time that the exchange load is at its peak. After the peak is passed and the load starts to lighten, the charging equipment is disconnected and the battery allowed to discharge on its reserve capacity to a minimum predetermined voltage before starting the charging cycle. This method is used principally to conserve the capacity of the battery during the period of its greatest drain.

In the **trickle charge** system, a fixed amount of current is passed through the battery regardless of voltage variations, the battery discharging during the periods of heavy load and recharging during the periods of light load. The charging current is regulated at weekly intervals to maintain the correct specific gravity of the cells as noted by observation of the pilot cells. The trickle charge is the most commonly used method.

The **voltage control** or system governed method is a comparatively new practice in which the central office battery is placed on a charge-discharge basis, but the battery voltage is allowed to vary between narrow, fixed limits before being automatically connected to or disconnected from the charging equipment. Variations of the voltage control method include the TVR control, self-regulating, permeability control, and diverter-pole charging methods, detailed descriptions of which are outside the scope of the article.



A typical telephone battery installation at the Pa. Tel. Corp., Johnstown, Pa.

Charging Procedure

THE proper charging procedure and charging rates for the particular type and size of central office battery utilized are essential if the full service life of the battery is to be obtained. Undercharging results in sulphation of the plates which reduces battery capacity. On the other hand, excessive charging that results in more than the normal amount of gassing causes abnormal decomposition of the water in

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Table No. 1—Operating Data on Various Types and Sizes of Storage Batteries for Central Office Use.

Type of Cell	Max. Spec. gravity (new fully charged cells)	No. of Plates	Discharge range from full charge to complete discharge points sp. gr.	Allowable drop during capacity test points sp. gr.	Full charge points below max. sp. gr.	Max. normal 8-hour charging Rate Net-to-Battery amperes
Exide Closed Cell Glass						
DMGO	1.210	3	13	9	5	2.5
		5	29	19	5	5
		7	42	28	5	7.5
		9	38	26	5	10
EM	1.210	5	27	18	5	10
		7	36	24	5	15
		9	37	25	5	20
		11	38	26	5	25
		13	40	27	5	30
		15	41	28	5	35
BI	1.215	5	60	40	15	1.5
		9	69	46	15	3
BTE	1.220	5	42	28	15	2
		7	76	50	15	3
BTER	1.210	5	44	32	15	1.5
		7	79	52	15	3
KZHG	1.225	7	105	70	15	3
KZHGR	1.210	7	96	62	15	3
LXG	1.210	9	138	85	15	6
	1.210	15	132	85	15	10.5
LXGH	1.200	7	83	53	15	5
		9	115	75	15	6
		13	101	70	15	9
		15	121	81	15	10
BTMH		2	38	25	5	.75
CTMH		2	21	14	5	1.5
PTMH		2	28	18	5	3
ETMH		2	24	16	5	4.5
Philco Closed Cell Glass						
EPG	1.225	7	65	42	5	15
		9	70	42	5	20
		11	75	50	5	25
		13	80	55	5	30
		15	80	55	5	35
UX	1.240	5	80	55	10	1
		9	105	70	10	2.5
DHO	1.240	2			10	.25
DHN		2			10	.25

Note—Refer to manufacturer's data on type of cell for exact charging information.

the electrolyte, making very frequent addition of water necessary to maintain the level, and may loosen the active material.

At the time the storage battery is installed it is given an initial charge for a period of 35 to 55 hours if it was received in an uncharged condition. The exact charging time is governed by the charging rate, the size of the battery, and the condition of the battery plates. If the battery was received in a charged condition, it is only necessary to give it a **freshening charge** in accordance with the manufacturer's instructions.

When the central office battery is on a charge-discharge basis, the battery is placed on charge when the specific gravity falls to two-thirds or one-half of the total gravity drop required to reach the completely discharged state for the type and size of the battery shown in Table No. 1. This **regular charge** should be started and completed during the working day so that the necessary hydrometer readings can be taken. If necessary, the charge may be started before the specific gravity has dropped to two-thirds of the total gravity range in order to complete the charge before the end of the working day.

The battery is said to be **fully charged** when the corrected specific gravity of the pilot cell reaches within five, ten, or fifteen points of the maximum corrected specific gravity measured on the last overcharge for the type and size of battery listed in Table No. 1, and when all cells are gassing, though not as freely as on overcharge.

To restore the battery to as nearly its normal specific gravity as possible, and to maintain its capacity, the battery is given an overcharge (also called an equalizing charge) at certain regu-

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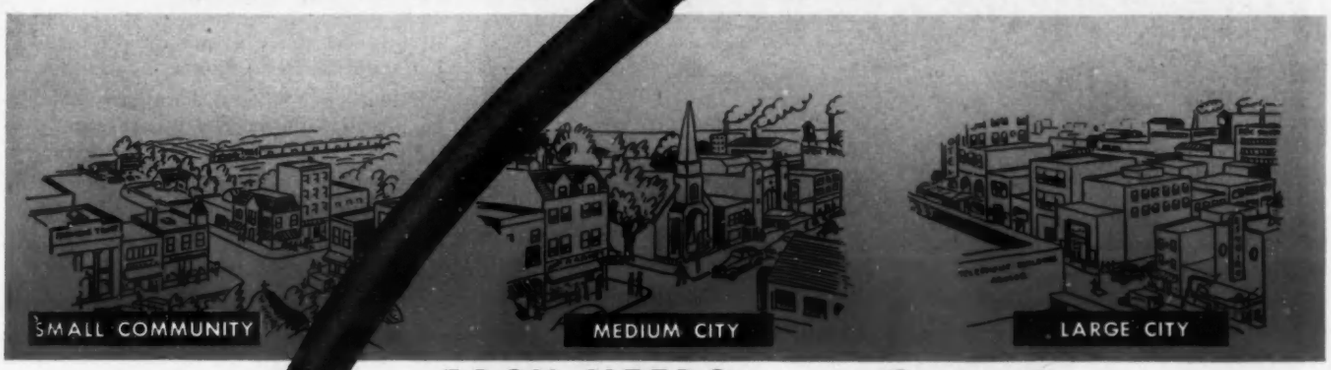

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lar intervals. This is merely a regular charge continued at a normal 8-hour charging rate until (1) all cells are gassing freely, and (2) two consecutive equal readings are obtained, followed by five successive 15-minute readings that show no rise in the specific gravity.

If the net-to-battery charging rate is smaller than the normal 8-hour charging rate, indicated in Table No. 1, the number of 15-minute readings must be increased in accordance with the following formula:

$$\text{No. of 15-minute readings} = \frac{4 \times \text{Normal 8-hour Charging Rate}}{\text{Net-to-Battery Charging Rate}} + 1$$

On a lower charging rate than normal, the cells may not gas so freely.

Central office batteries, on the average, should be given an overcharge at the intervals indicated in Table No. 2 on page 66.

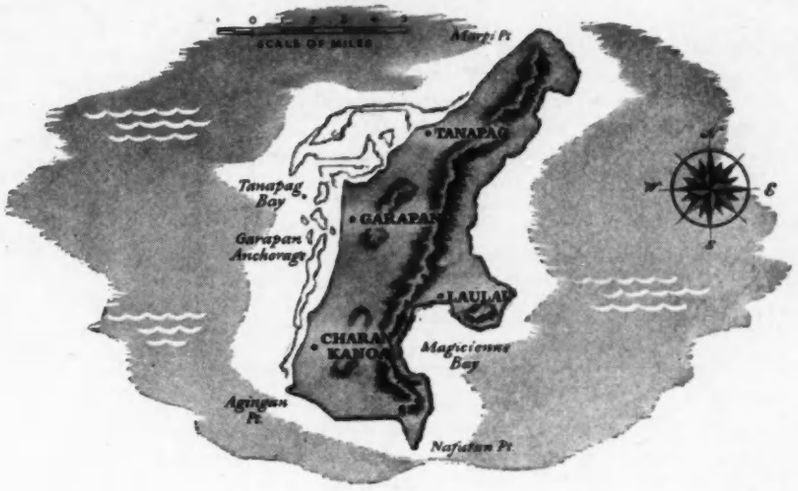
Charging Rates

THE normal charging rate for a particular size and type of central office battery is specified by the manufacturer and is shown in Table No. 1. The rate is so adjusted that the battery, if on a charge-discharge basis, will be fully charged at the end of eight hours. This rate is termed a net-to-battery rate since it is the amount of current supplied to the battery and not to the load during the time the battery is being charged. When it is not possible to determine the net-to-battery rate directly, it is found by subtracting the exchange load read on the discharge ammeter from the output shown by the charger ammeter.

For batteries operated on a floating or trickle charge basis, the current taken by the cells varies with the temperature, age, and state of discharge of the battery when the voltage across each cell is held to 2.15 volts. In general, at the normal battery temperature, normal cell voltage (2.15 volts for at least one hour prior to the test), and fully charged condition of the cells, the current into the battery is about 1 percent of the normal 8-hour charging rate specified for the size and type of battery. If this trickle rate is consistently less than ½ of 1 percent or more than 4 percent of the normal 8-hour rate, the meters should be checked for inaccuracy, particularly the voltmeter since an error of 5 percent or even less in the calibration of this meter can result in undercharging or overcharging of the battery to a serious extent. The voltage per cell may be as much as 2.20 and as low as 2.10 with an average of 2.15 volts. For an 11-cell battery the total average voltage would be 23.65 volts with a maximum of 24.2 volts and

This tiny dot in the Pacific . . .

SAIPAN



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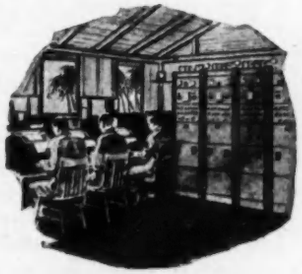

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Table No. 2—Proper intervals at which battery should be overcharged.

Charging Method and Number of Regular Charges	Intervals at which an Overcharge is Required
Continuous Floating, Trickle, and Voltage Control	Every three months (after capacity test)
Charge-Discharge—1 charge per week	Every month
Charge-Discharge—2 or 3 charges per week	Every two weeks
Charge-Discharge—4 or more charges per week	Every week
Charge-Discharge—Less than 1 charge per week	Make every charge an overcharge

If the temperature of the battery rises to 110°F. or more, the charger should be immediately disconnected and not reconnected until the temperature has dropped to 95° or to the room temperature if the latter is greater than 95°F.

maximum of 23.1 volts. If the charging rate is such that the battery voltage is over the maximum at all times, the water in the cells will be decomposed, making necessary frequent additions of water, and the battery life will be shortened. On the other hand, if the battery voltage is under the minimum, the charging rate is insufficient to supply the battery losses plus the exchange load drain, resulting in a gradual lowering of the specific gravity. Voltage variations of short duration over and under the limits are inconsequential and need cause no concern.

Making the Capacity Test

TO determine if the central office battery has sufficient reserve capacity to carry the exchange load in case of failure of commercial electric power supplying the central office, a capacity test should be made every three months. In this test, the battery is made to carry the whole exchange load in addition to stand-by ringing and interrupting equipment operated from the battery, the charging equipment being disconnected for the duration of the test.

As soon as the charger has been disconnected, corrected specific gravity and voltage readings are taken of each cell and recorded, and additional readings are made each hour until the battery has carried the load continuously for six hours, or until the corrected specific gravity has dropped the maximum number of points specified in Table No. 1, or the voltage of each cell has fallen 1.90 volts, or equipment trouble due to low battery voltage results, such as unsatisfactory supervision, irregular relay operation, and dimming of switchboard lamps. At the same time, a record is made at half-hour intervals of the current drawn from battery by the load.

As soon as this test is completed, the battery should immediately be placed at the normal rate on charge to restore its full capacity, the charge being continued until the conditions of an overcharge are fulfilled.

From the record of the readings taken during the capacity test it is possible to determine the condition of each cell of the battery and thus be on guard against failure of the battery.

Care of the Central Office Battery

THE purpose of central office maintenance is to keep the essential elements of each cell in as nearly good condition as when the battery was installed. Regular inspection coupled with intelligent care will accomplish much toward obtaining the maximum possible service life of the battery.

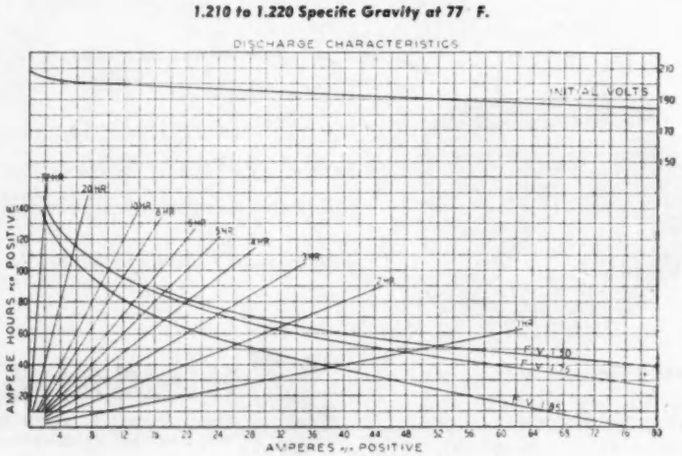
Aside from regular attention to cell operation (taking of specific gravity and voltage readings, adding battery water, adjusting charging rates and the like), the following maintenance and inspection routines should be observed.

The cells should be regularly inspected for signs of leakage, which may be the result of electrolyte creepage or a crack in one or more of the cell jars. Defective jars should be replaced as soon as possible. The outer surfaces of the cell jars and covers should be wiped dry of accumulated moisture quite frequently. At least once each month all exposed surfaces of open type cells and the surrounding equipment should be wiped with a cloth soaked with baking soda solution, exerting due care not to get the solution into any of the cells. As soon as these surfaces are dry, they should be wiped with a cloth dampened with a small amount of linseed oil. Glass covers should be rinsed in clear water and thoroughly dried before replacing on the cell jars.

It is important that the cells be kept dry of condensed moisture or eletrolyte on the outside to prevent leakage of electrical current to ground, as well as to prevent corrosion of supporting surfaces.

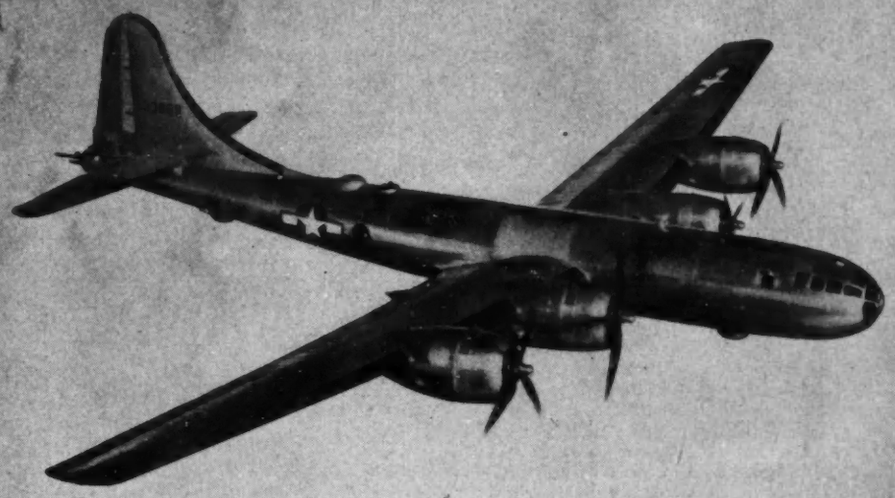
Sometimes impurities may find their way into cells, especially the open type cells, and cause serious depletion of the cells through local action or neutralization of the electrolyte. This may happen as the result of tools, plaster, pieces of wire, rust, or condensed moisture falling into the cells. If any large amounts of such substances have dropped in a cell, the plates must be removed, washed, and charged in water to eject any harmful matter that may have entered the plates. The contaminated electrolyte should be replaced with fresh electrolyte of the proper specific gravity. After the cell has been reassembled, it should be given the same kind of charge as when it was originally installed, and the specific gravity adjusted to the proper value by addition or subtraction of electrolyte.

To assist the battery attendant in determining whether a certain substance entering the cell is harmful or not, the following lists inert or harmless substances that need only to be removed when discovered. Items not



A graph of the discharge characteristics of Philco's type FFP telephone storage battery.

SPEED NUTS OVER TOKYO



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FASTEST THING IN FASTENINGS

shown in the list may be regarded as harmful to the battery and may require dismantling of the cells and repurifying of the plates and electrolyte. Substances indicated as inert do not react with the electrolyte; the others may or may not cause a harmless reaction.

Asphalt	Mercury
Alum	Mica (inert)
Arsenic	Naptha
Antimony	Oil
Agate	Petroleum (inert)
Beeswax (inert)	Paint
Benzine	Plaster-of-Paris
Banana oil (inert)	Paraffin
Brick	Porcelain (inert)
Coke	Quartz
Coal	Rosin
Chewing gum (inert)	Rubber (hard or soft)
Carborundum	Sand (clean)
Carbon	Silver (inert)
Epsom salts	Sulphur (inert)
Flourspar (inert)	Slate
Feathers	Soot
Gasoline	Tungsten
Glass (inert)	Tantalum (inert)
Flint	Talcum powder (inert)
Gasoline	Tile
Gold	Vaseline (inert)
Hair	Varnish (inert)
Kerosene	White lead
Magnesium	

As the result of the charging action, active material is more or less gradually loosened and settles to the bottom of each cell as sediment. If the sediment rises until it touches the plates, short circuiting of the plates may result. Excessive accumulation of the sediment must be looked for in the inspection routine, and this condition corrected by leveling of the sediment as required. In the case of closed cells, sufficient room is always provided by the manufacturer for accumulation of the sediment under normal conditions so that by the end of the service life of the cell, this sediment has risen to its maximum level. Excessive accumulation of sediment in open cells and lead lined tanks requires the dismantling of the cell or tank to remove the sediment.

Excessive charging of the central office battery results in the formation of a growth on the upper edges of the negative plate. This growth is composed of spongy lead and is termed **moss.** Such growth must be removed to prevent short circuiting of the plates in a manner similar to the action of bottom sediment. A wooden paddle should be used to remove the moss, care being exercised not to allow the growth to fall to the bottom of the cell jar. Further growth of the moss can be prevented by reducing the length of each overcharge slightly. This is most effectively

"Ladder" used in India by Signal Corpsman checking a splice. Elephants are the only means of transportation through the swamps of India. Signal Corps Photo.

done by allowing the specific gravity to rise to two points **below** the five, ten, or fifteen point limit under the maximum specific gravity for the type of battery in Table No. 1, before ending the charge.

Excessive charging also may cause buckling of positive plates due to excessive action on one side of the plate and insufficient action on the other side. Buckled plates may crack and eventually break and fall to the bottom of the cell. Such broken pieces must be removed, though the part remaining attached to the connecting lug may be left in for a time without seriously affecting the cell capacity. Badly buckled plates may cut through the separator and cause short circuits with resulting loss of cell capacity. Such a condition must be corrected at once by replacing the defective plates or the whole cell.

All battery connections should be inspected each month to make sure they are tight and have not become corroded. Corroded connections can cause serious trouble if neglected and must be immediately looked after when found. The affected connections should be strapped out and then taken apart to be thoroughly cleaned and wiped with a cloth dampened with baking soda solution. As soon as the connections are dry, they should be covered with a thin coating of plain vaseline, after which they should be reassembled and the through-bolt tightened. Each week for three weeks, the bolts should be tightened to assure an absolutely snug fit that will not loosen with the passage of time.

The room and battery supports and racks should be painted with an acid resisting paint. The floor should be protected in the same manner. Concrete floor is very easily damaged by battery electrolyte and must be carefully watched to make sure that the protective covering has not worn off. If any painted surfaces shows indications of damage from the electrolyte, such damage must be repaired at once. This is most easily accomplished by first removing all particles of loose paint and corrosion, washing the surfaces with soda solution, and allowing them to dry thoroughly before painting. If concrete floor has been damaged by electrolyte, all affected parts should be scraped to remove crumbly cement, then washed with soda solution, resurfaced with concrete and painted with several coats of the acid resisting paint after the concrete is dry.

The battery room itself should be kept clean at all times. Only equipment essential to the operation of the battery should be kept in this room. To keep the floor free of acid, especially when open-type cells are utilized, the floor should be washed at regular intervals (once each month) with a solution of baking soda. The soda will react with any acid sprayed or spilled out on the floor from the cells and prevent any harmful action on concrete or wood floors in places where the paint may have been chipped or worn away. The walls should also be wiped with the soda solution.

Conclusion

BATTERY manufacturers have put out storage batteries of remarkable reliability and ruggedness. Such batteries do not require so much attention as older types have demanded, especially with modern methods of automatic voltage control systems of battery charging. This is important in the case of storage batteries utilized in unattended automatic exchanges which are visited by a maintenance man only once every week on the average. Although the care of these batteries is thus greatly simplified, it is even more important that battery operation and maintenance routines be carefully followed, since it is not possible to check the battery frequently enough, as in the case of central office batteries attended daily, and thus detect incipient trouble before serious damage results to the cells.

A later article will discuss battery troubles and the use of records in the care of central office batteries.

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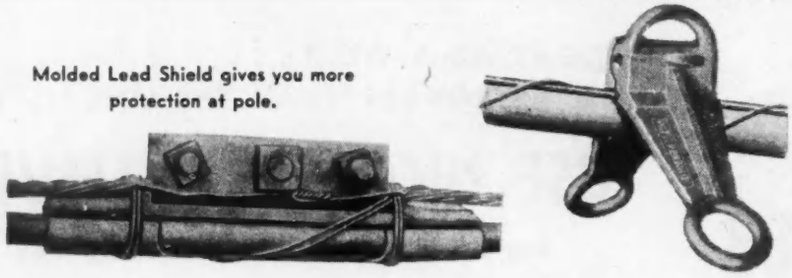
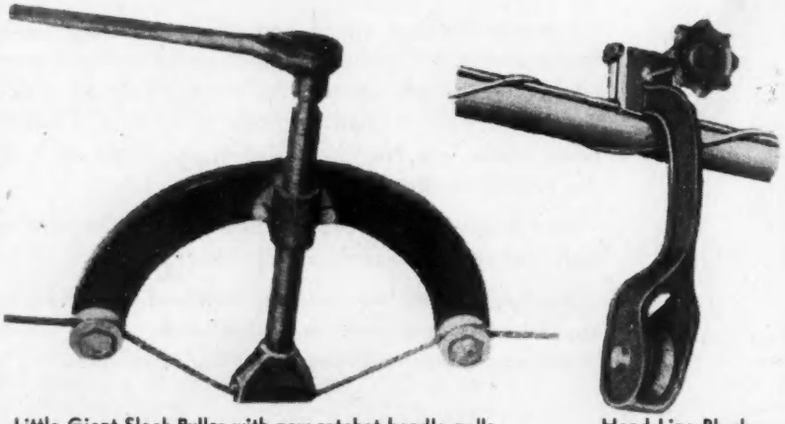
5. Cost of "maintenance spinning" is low!
6. Spun cable gives you a "good looking" plant!
7. Repairs on spun cable are made easy with the "Little Giant" Slack Puller and Accessory tools. Correctly designed maintenance tools do the job quickly and cheaply!

Platform Clamp
(no wrenches needed)

Molded Lead Shield gives you more protection at pole.





Little Giant Slack Puller with new ratchet handle pulls slack quickly, makes repairs easy.

Hand-Line Block
(no wrenches needed)

Your jobber will help you plan for maintenance spinning.

CABLE SPINNING EQUIPMENT COMPANY
TOPEKA, KANSAS

OPA Activity

The OPA Public Utilities Division has not yet decided on the make-up of its Advisory Committee on telephone rate matters. It is expected that membership and organization plans will be completed and in operation within the month.

April promises to be a busy month for OPA intervention in the application of independent telephone companies for increased rates. Hearings have been scheduled before the Minnesota Railroad and Warehouse Commission to oppose increases sought by the Washington County Rural Telephone Co., the Farmers Telephone Co., the Kasson and Manterville Telephone Co., and the United Telephone Co. OPA will intervene before the Michigan Public Service Commission to oppose the application of the Citizens Telephone Co. of Darien and the Baroda Telephone Co.

Intervention has been made before the Missouri Commission in opposition to increases sought by the Citizens Telephone Co. Applications have been withdrawn by the United Telephone Co. of Ohio and the Phillipsburg and Verona exchanges of the Ohio Standard Telephone Co., following OPA intervention. The Michigan Public Service Commission, after intervention, denied entirely the application of the Moore Telephone System for increased rates for local service at its Caro and Marlette exchanges, holding in part that "the service rendered is not worth the charges now being made for it".

Increase To Insure Service

Mt. Hood Telephone Company, Dufur, Oregon, showed their commission an actual operating loss since 1941 and was granted an increase. The commission stated that the requested increase was only sufficient to provide a justified increase in operators' salaries and to place the system in proper operating condition and that the increase would not result in the company obtaining a fair rate of return on its investment. Leslie Gritten in his Oregon Association bulletin remarked, "This is painfully typical of many of our little Independent companies. The OPA had requested that the increase be held to a bare minimum necessary to guarantee service, and nothing was said about guaranteeing a living to the owners. Anti-inflation measures are vitally necessary, of course: but as soon as OPA influence is no longer a factor, we should make a concerted drive for adequate rates."

Stromberg-Carlson Appointments

Dr. H. R. Reed has been recently appointed chief telephone engineer of the Stromberg-Carlson Company and Edward G. Eidam, former chief telephone engineer, has been made consulting engineer for the telephone engineering department. Mr. Eidam, after more than forty years of service with Stromberg-Carlson, expects to retire at the end of 1945.

H. R. Reed E. G. Eidam

Dr. Reed, who succeeds him in the key post, joined Stromberg-Carlson last year as an engineer on the staff of Frederick C. Young. Dr. Reed's working experiences include periods spent with the Electrical Machinery Manufacturing Company, of Minneapolis, Minn., the Westinghouse Electrical Mfg. Company, East Pittsburgh, Pa., an instructorship in electrical engineering at South Dakota State College, an associate professorship in the same subject at the Michigan College of Mining and Technology, engineer with the U. S. Army Corps of Engineers and a professorship of electrical enginering at the University of Iowa. He is the author of numerous texts on electrical engineering.

U. S. Rubber Develops 53 Synthetic Rubbers

Fifty-three new synthetic rubbers were produced in the three synthetic rubber plants operated by United States Rubber Company during 1944, according to J. P. Coe, general manager of the company's Naugatuck chemical and synthetic rubber divisions.

Of these new rubbers eight types have been adopted for regular use in the manufacture of rubber insulation of electric wire and cable, porous rubber storage battery separators, asbestos sheet packing, and pressure sensitive adhesives. During the past year 14 million pounds were made for these special purposes.

STROMBERG-CARLSON
RECOMMENDS—

Crapo
HIGH-TENSILE
LINE WIRE

For Long-Span Low-Cost Lines

Construction costs are reduced to a new low level, maintenance expense is minimized, wherever Crapo HTL-85 and Crapo HTL-135 High-tensile, Low-resistance Line Wires are used. These revolutionary wires, with their superior strength, make possible rural lines with span lengths one and one-half to two and one-half times greater than were practical heretofore.

Crapo HTL-85 permits spans to 225 feet in heavy, 325 feet in medium, and 375 feet in light loading districts; provides stronger spans on existing pole structures.

Crapo HTL-135 makes possible spans of from 350 feet in heavy to 500 feet in light loading districts. Both wires possess superior telephonic transmission qualities.

Crapo HTL-85 Crapo HTL-135

Write for technical data!

Higher sustained voltage
Longer life
Rock-bottom economy

These qualities—more important now than ever before—are assured through the constant supervision of America's largest dry battery laboratory.

Made by the makers of "Eveready" "Air Cell" Operators' Transmitter Batteries.

STROMBERG-CARLSON COMPANY
Factory and General Offices: Rochester 3, New York, U. S. A.
Branch Offices: Chicago, Kansas City, San Francisco, Toronto

STROMBERG-CARLSON
RECOMMENDS—

FOR STRENGTH AND ECONOMY— Specify

DIAMOND

Look for the DIAMOND C on Creosoted Yellow Pine Poles

For the greatest strength in poles, use COLFAX Creosoted Yellow Pine Poles.

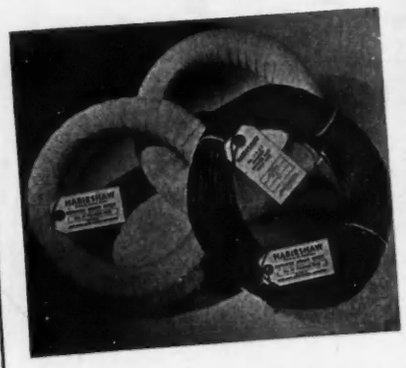
The poles are treated full length under pressure with the finest and cleanest obtainable grade No. 1 Creosote Oil, a pure distillate of coal tar, in accordance with AWPA standards.

Each pole, after being carefully graded according to the physical specifications, is treated with eight pounds of creosote, or more if the customer desires.

COLFAX Creosoted Yellow Pine Poles will assure you the lowest annual pole cost obtainable.

Mfd. by Colfax Lumber & Creosoting Company, Inc.

HABIRSHAW



No. 17 Bronze Drop Wire

Distributed Exclusively by STROMBERG-CARLSON

High strength bronze conductor . . . expertly blended synthetic rubber insulation . . . soft, unbleached cotton braid, thoroughly saturated to provide a long-lived moisture-resisting covering.

A Quality Product Made by Phelps Dodge Copper Products Corporation

Habirshaw Cable and Wire Division

STROMBERG PROGRESS IN TELEPHONY CARLSON

STROMBERG-CARLSON COMPANY

Factory and General Offices: Rochester 3, New York, U. S. A.
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Yankee Ingenuity and Tubes Outwit the Nazis

When the Germans withdrew from France, they left almost intact the auxiliary telephone equipment which had been installed to supplement existing civilian systems. But they took pains to remove or smash the vacuum tubes which are essential to the telephone repeaters, tubes needed to overcome the weakening of the voice currents as they pass over miles of wire. The German intention was obvious. They believed that we could not replace these tubes, which were of a German type different from ours, and that we could not use their equipment.

One of these German tubes fell into the hands of Brigadier General Carroll O. Bickelhaupt, (in peace time V. P. of the Amer. Tel. & Tel. Co.) on duty with the Signal Corps in the Eupean Theatre of Operations. He gave it to Dr. Vannevar Bush, Chairman of the National Defense Research Committee, who was about to return to the United States. Dr. Bush, upon reaching the States, had NDRC place contracts with two American firms for copies of the sample. Each firm was to make a thousand of the tubes. One was to make approximate copies very quickly out of parts and materials already on hand; the other was to take the necessary time to make exact replicas, duplicating all the separate metal and glass parts that were in the German tube. The firm which was to rush through the approximations actually constructed the first eight tubes within three days; and within three weeks the entire lot had been delivered. To make such speed possible the tube-bases were manufactured by a friendly competitor, using an available mold hastily modified to meet the requirements. The firm which was to make exact replicas achieved this feat, which called for great technical care, in five weeks. These perfect copies, as fast as they were produced, were shipped to Signal Corps representatives in France. They worked as well as the originals could have worked, and the telephone system functioned efficiently.

The original German tube was a cathode-type pentode, different from any known American tube, not only in electrical characteristics and in heater voltage, but also in the dimensions of the bulb and in the disposition of the contact pins. In accordance with common practice in Europe it was provided with electrostatic shielding by means of a metal coating sprayed on it in the form of molten particles.

Purchases Exchange

V. L. Bradley is the new owner and manager of the Argyle (Minn.) Telephone Company, which he purchased from Mrs. Ellen Austin.

Falk Joins Dictograph

Alexander J. (Al) Falk, who has been serving as assistant chief of the telephone section of the WPB Communications Division for the past three years, joined the Dictograph Intercommunications Products, Inc. April 1 as its Washington representative to contact the military services. Mr.

A. J. Falk

Falk is well known to the Independent industry and during his WPB service was especially helpful to Independent companies in handling their activities under U-2 and U-3 orders and in connection with appeals on telephone installations. He formerly was with Western Electric for 14 years as a central office equipment engineer.

New Manager

Ray J. Alter is the new general manager of the Middle States Utilities Company of Plattsburg, Missouri. Mr. Alter formerly managed the Citizens Telephone Company of Circleville, Ohio. Prior to the Circleville position he was general manager of the Clinton Telephone Company of Wilmington, Ohio and assistant commercial superintendent of the Home Tel. & Tel. Co. of Fort Wayne, Indiana.

Holds First Meeting

The new telephone company near Williston, N. D. held its first meeting recently, named itself the "Stony Creek Mutual Aid Corporation" and sold 11 shares of stock.

STROMBERG-CARLSON
RECOMMENDS—

GENUINE IRONITE DROP WIRE

A recognized leader for forty years, because of its strength . . . long-life . . . conductivity, and easy workability.

ONLY GENUINE IRONITE CARRIES THIS TAG

Look for it

Reliable CLAMPS FOR GROUND CONNECTIONS

Reliable Clamps include a complete range of sizes and styles for all telephone, radio and signal circuit station grounds. These clamps are fully described in Reliable Telephone Specialties Bulletin. Request your copy.

Ground Rod Clamps for ½", ⅝" or ¾" steel or copperweld rods.

Kling Klamp for copper or iron ground wires.

Station Ground Clamps are adjustable for grounding to water pipe.

"Reliable" IDENTIFIES THE QUALITY

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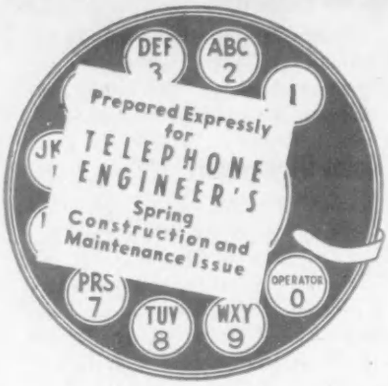

PLANNING

Construction Projects

SCIENTISTS say that we know nothing about a new effect until we can measure it. Similarly a telephone man knows nothing about a construction project until he has carefully surveyed it and put the story down on paper. Planning a construction project is just as important as the actual construction work. In speaking of construction projects I am thinking of extensive pole line rebuilding jobs, construction of a substantial amount of new cable plant, the replacement of a switchboard, etc. The various steps involved in the planning and laying out of a construction project might be summarized under the following heads:

(1)—The field inspection.
(2)—Planning and mapping the work to be done.
(3)—Estimating the labor and material costs.
(4)—Placing orders for the necessary material.

Fig. 1—Inspecting pole line prior to making up an estimate of work required.

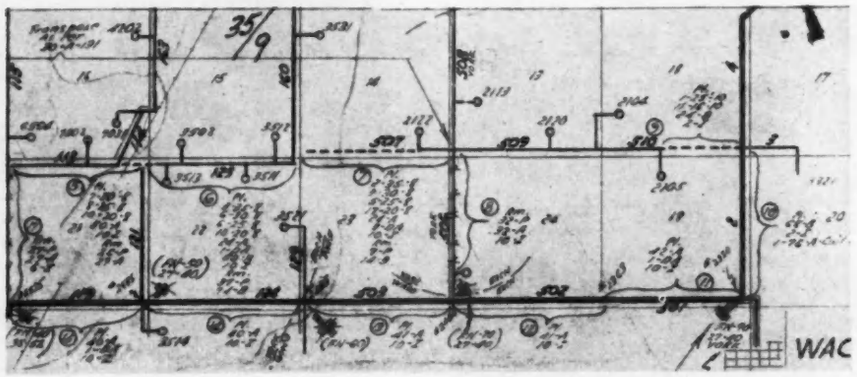

Fig. 2—Section of working sketch covering a pole line reconstruction job.

(5)—Making decisions as to construction methods to be employed.
(6)—Checking tools and equipment to insure that everything needed to expeditiously handle the job is available.
(7)—Arranging for adequate man power.

Surveying the Work to Be Done

THE initial step in planning a construction project is to make a thorough field inspection. This usually consists of checking the condition of poles, wire and cable to determine the amount of work to be done and the material needed to do it. Pole condition can often be determined by casual observation but generally will require an examination of the ground line section of the pole, test borings, or pike pole tests (Fig. 1). Wire condition is judged by the degree of corrosion, number of splices and the worn condition at the tie wires. Wire which is discolored but not actually rusty or pitted will generally prove worth leaving unless it contains many splices or the wires must be handled because of pole line changes. Copper wire may require replacement because of its

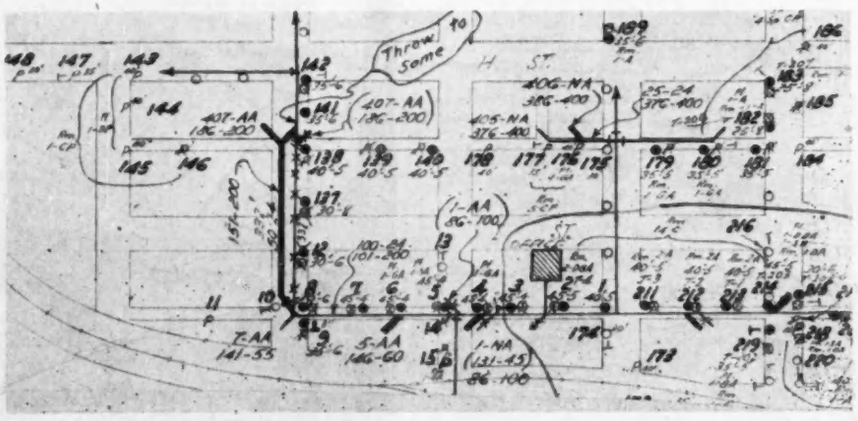

Fig. 3—Section of working sketch covering a cable reconstruction job.

badly worn condition at the insulators where the tie wire has chafed it and where it would be likely to break under storm conditions.

The adequacy of clearances above highways and private drives should be noted and taller poles spotted where needed. Clearance from power wires is also a factor that should be carefully observed and recommendations made for improvement where needed. When inspecting cable plant, the cables which may subsequently require replacement because of lack of vacant pairs should be known so that measurements can be obtained, necessary pole line changes arranged for, etc. Cables which are satisfactory from a load standpoint should

Fig. 4—Checking ground clearance on crossings.

be examined to determine what repairs may be needed and to check on material requirements in the event the cable is to be transferred to a new pole line. In considering reconstruction of existing cable leads the need for pole relocation in order to avoid private driveways or to obtain better drop feeds should not be overlooked.

Inspection Maps

AFTER the inspection is completed, the next step is to plan the work and prepare working sketches which will show the type of work to be done and the material requirements. Different methods are used to graphically represent the work to be done and the material requirements on a construction project. A method which is popular with some of the larger companies is to show on fairly large scale maps the amount of material to be placed and removed in each mile section of line.

Fig. 2 shows a section of a typical map covering a pole line reconstruction job. It will be noted that the height and size of poles, number of arms, and kind and number of wires to be both placed and removed are shown. A section of map covering a cable repair job is shown in Fig. 3. It will be seen that the cable to be placed is shown in heavier code than

STROMBERG-CARLSON
RECOMMENDS—

Privacy and Comfort When Telephoning

The
CHURCHILL
No. 100 Folding Door
TELEPHONE BOOTH

. . . will bring you new customers and insure the old ones returning. People enjoy the privacy and comfort afforded by the CHURCHILL Telephone Booth.

It is constructed as a single unit and equipped with a reinforced back panel for mounting a wall telephone or coin collector.

The **CHURCHILL** Booth is made of selected white oak and is available in light or medium oak in a satin finish.

Included as standard equipment are electric light and automatic electric ventilator.

Overall height is 84¾"; width, 29"; depth, 30½". Shipped knocked down and crated.

Illustrated literature available.

RAYTHEON
RectiChargeRs
MEET POWER
SUPPLY DEMANDS

Cover
Open

Completely automatic in operation, a Raytheon RectiChargeR connected to your batteries provides an automatic A.C. — D.C. power supply system. Because it is entirely automatic and requires no attention, it is ideal for both unattended or central stations. Simply connect the RectiChargeR into the A.C. source and connect the output to batteries and it will keep the batteries fully charged. RectiChargeRs —

- Keep batteries fully charged.
- Prevent overcharge and undercharge.
- Eliminate voltage variations.
- Increase battery life as much as 40%.
- Reduce battery maintenance and inspection to once or twice yearly.
- Complete range of units — 11/12 & 22/24 cells . . . 1 to 12 amps . . . many models for 50 cycles input.

Write for Bulletin DL 48-2638.

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Table No. 1—Pine Pole Line Design Data—Rural Poles—Heavy Loading Area

Number of Wires	Class of Poles	Number of Poles of Each Height Required in "Average" Mile 35 ft.	30 ft.	25 ft.	20 ft.	16 ft.	Poles per Mile	Brackets	Crossarms 6-pin	Crossarms 10-pin
1-2	4-in.	....	....	8	8	20	36	72	....	....
3-4	4-in.	....	....	8	8	20	36	144	....	....
5-6	5-in.	....	....	8	8	20	36	....	36	....
7-10	5-in.	....	....	8	8	20	36	....	....	36
11-12	E	....	2	8	30	....	40	80	....	40
13-14	E	....	2	8	30	....	40	160	....	40
15-20	E	....	2	10	36	....	48	....	....	96
21-22	E	2	8	8	30	....	48	96	....	96
23-30	D	2	8	8	30	....	48	....	....	144

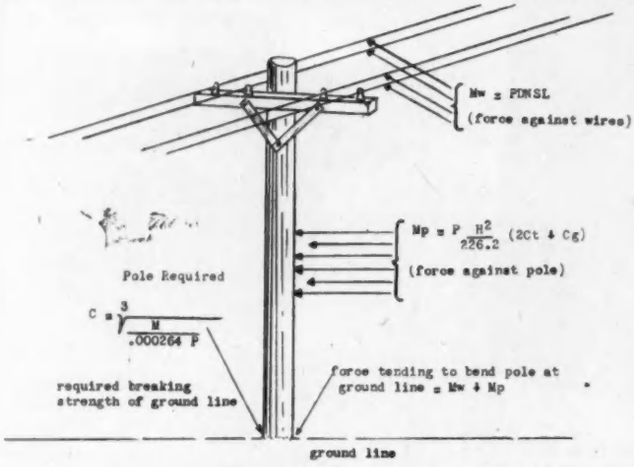

Mw = PDNSL
(force against wires)
Mp = P H² / 226.2 (2Ct + Cg)
(force against pole)
Pole Required
C = ∛(M / .000264 P)
required breaking strength of ground line
force tending to bend pole at ground line = Mw + Mp
ground line

Fig. 5—Pole line design formula.

on the number of poles to use per mile.

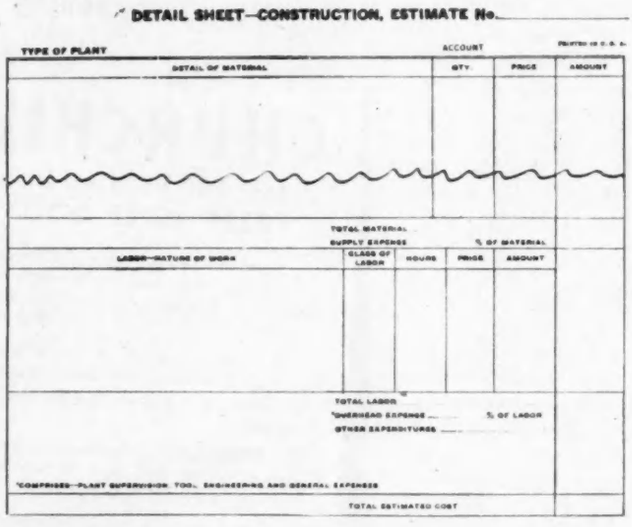
The class of pole which should be used will depend on the loading area, number of wires, span length and desired safety factor. Tables No. 1 and 2 show the approximate class of pine or cedar poles for various rural wire leads. These tables are for the heavy sleet area and lower class poles should be used in areas not subjected to heavy storms. Mathematically inclined managers can compute the required pole sizes by formulas as shown in Fig. 5.

If wire changes are involved an examination of the adequacy of the existing circuits should be considered.

the cable which it replaces. Companies that do not have base maps available will find that county maps can usually be procured through the county clerk or county surveyor's office and the information can be recorded directly on these prints.

Plant Design Problems

ON pole line reconstruction jobs where no wire changes are involved the principal question is pole size, height and span spacing. If all or a large percentage of the poles are to be replaced, it may be desirable to select a new span length. Sleet storm exposure, type of line wire and ground clearance will of course need to be taken into account in deciding


DETAIL SHEET—CONSTRUCTION, ESTIMATE No.

TYPE OF PLANT — ACCOUNT

DETAIL OF MATERIAL	QTY.	PRICE	AMOUNT
TOTAL MATERIAL			
SUPPLY EXPENSE		% OF MATERIAL	

LABOR—NATURE OF WORK	CLASS OF LABOR	HOURS	PRICE	AMOUNT
TOTAL LABOR				
*OVERHEAD EXPENSE		% OF LABOR		
OTHER EXPENDITURES				

*COMPRISED—PLANT SUPERVISION, TOOL, ENGINEERING AND GENERAL EXPENSES

TOTAL ESTIMATED COST

Fig. 6—Specific estimate sheet cut down for reproduction. Original size was box of 7½" x 9½".

Table No. 2—Cedar Pole Line Design Data—Rural Poles—Heavy Loading Area

Number of Wires	Class of Poles	Number of Poles of Each Height Required in "Average" Mile 35 ft.	30 ft.	25 ft.	20 ft.	16 ft.	Poles per Mile	Brackets	Crossarms 6-pin	Crossarms 10-pin
1-2	5-in.	....	....	4	6	26	36	72	....	....
3-4	5-in.	....	....	8	8	20	36	144	....	....
5-6	6-in.	....	....	8	8	20	36	....	36	....
7-10	6-in.	....	....	8	8	20	36	....	....	36
11-12	6-in.	....	2	8	30	....	40	80	....	40
13-14	6-in.	....	2	8	30	....	40	160	....	40
15-20	6-in.	....	2	10	36	....	48	....	....	96
21-22	6-in.	2	8	8	30	....	48	96	....	96
23-30	C	2	8	8	30	....	48	....	....	144

Particular attention should be given to the need for additional circuits that may be required to split up overloaded party lines or to provide additional toll facilities to nearby towns.

From a design standpoint, cable plant changes are usually more involved than wire and pole changes. If existing cable plant is congested and requires relief, a study must be made and a decision reached as to whether the existing cable should be replaced, reinforced by a second cable on the same route or a new relief feed established on a different route. After the method of providing relief is selected, thought must be given to the size cable to employ and the multiple arrangement.

Fig. 7—Is everything needed on order?

The design of cable plant is not as complicated as might at first appear. Those interested will find information on this subject in the back issues of TELEPHONE ENGINEER.

Estimating the Cost

MANY companies, particularly the larger ones, require that the cost of construction projects be carefully estimated and submitted to the management for approval before the work can be undertaken. Even in the smaller plants cost estimates are desirable. An estimate of the cost of any construction project can be arrived at by either a detailed study of the labor and material costs or by the use of **cost units** which give the average cost for constructing the various items of plant. What are known as **specific estimates** are made by the larger companies to determine construction costs. These estimates include the material, labor, supply and supervisory expense, and other miscellaneous expense items incident to plant construction. Fig. 6 shows an estimate sheet of the type used by some of the larger operating companies. After obtaining an estimate of the cost and writing up the summary which explains the necessity and details of the work to be done the complete estimate is submitted to the management for their approval. After the approval is received the material may be ordered. An adequate

STROMBERG-CARLSON
RECOMMENDS—

Are Your Lines SAFE?

When a pole goes down, the cost of pole and wire replacement goes up.

The new DILLON BISECTOR will cut your chances of guying failures to the absolute minimum. ***Without*** the supervision of an engineer, a workman can ***accurately*** bisect the angles and spot anchors at the exact point where they will function at 100% efficiency.

S-I-M-P-L-I-C-I-T-Y

The Keynote of the New DILLON BISECTOR

Easy to use—Rugged—Compact—Lightweight—No skill to operate—***Eliminates*** tape lines or fancy figuring.

A QUALITY TOOL With a Real Purpose

SAVE TIME—SAVE MONEY SAVE SERVICE

USE THE DILLON BISECTOR

- NO CHARTS
- NO FIGURING
- NO MEASURING

DEFY THE ELEMENTS

HEMINGRAY No. 53
A single piece transposition insulator which can be used on standard pin.

HEMINGRAY INSULATORS are carefully designed to withstand the elements.

Experience has shown Hemingray Insulators never fail to render dependable, long-life service. That's why leading telephone companies have adopted Hemingrays as standard equipment.

Many of these famous insulators are still in service after 20, 30—and even 50 years.

The exacting step-by-step quality production control insures long life in every Hemingray Insulator.

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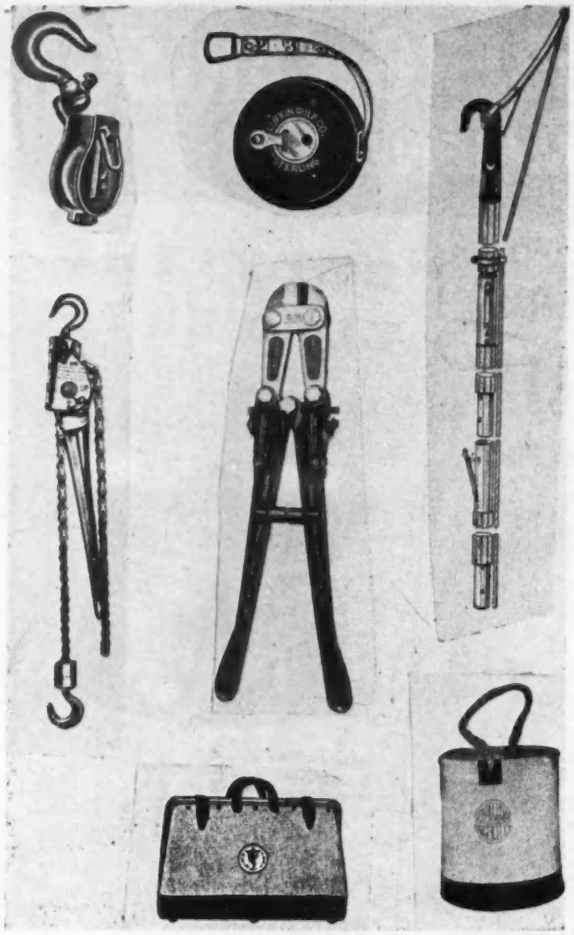

Fig. 8—Useful tools that are often omitted from construction trucks.

some of the small tools that help speed up work, yet are often missing from construction trucks.

If you are still using the old double tube sleeve method of line wire splicing, now is the time to consider the adoption of the compression type sleeve with its many advantages. In checking over your heavier tools consider the adequacy of your shovels,

Fig. 9—The pole jack will pay its own way.

tamps, wire reels and block and tackles. If you have not been taking advantage of the ease with which guys can be "pulled up" by means of chain hoists now is the time to consider the purchase of one of these convenient tools. Surprising as it may seem many companies do not have a pole jack. The initial cost of a good pole jack such as is shown in Fig. 9 can be retired by the labor savings effected on only a few pole moving jobs.

supply of all of the necessary construction items should be on hand before the project is started if the work is to proceed smoothly and without interruption. Many small items are often overlooked which result in the slowing up of a project. In these days of slow deliveries due to transportation tie-ups and material shortages it is of particular importance to be doubly careful in making out material orders for large projects.

Good Tools and Construction Equipment Needed

WITH labor costs high and men hard to get it is false economy to attempt to construct telephone plant with poor and inadequate tools and equipment. Almost any good tool will more than pay its way. A convenient way to determine whether or not your present tools are adequate is to make an inventory and check it against the tool section of your supplier's catalog. Note whether tools are shown which you do not have and which would tend to speed up the construction work or improve the quality. Such items as bolt cutters, canvas buckets, tool bags, new files, pruning saws, and measuring tapes are typical of

Table No. 3—Average Labor Units for Various Plant Operations

The following units should be considered as typical of only one company in one area. The labor required to perform these same operations in other localities under different conditions might be higher or lower. The units shown take into account travelling time.

Pole Labor Units (Digging Holes and Setting)	Labor Hours
16 ft.	1.6
20 ft.	2.2
25 ft.	3.0
30 ft.	4.1
35 ft.	5.1
brackets	0.06
6 pin arm	0.29
10 pin arm	0.31
anchor (small)	0.50
anchor (large)	2.50

Wire Labor Units (Stringing and tieing in)	Labor Hours
109 (No. 12—BWG) iron or steel	5.1 (per wire mile)
104 (No. 12—NBS) copper	5.3 (per wire mile)
Drop wire	0.6 (per 100 ft.)

Cable Labor Units (Includes stringing strand—pulling in cable)	Labor Hours
25-22	7.2
50-22	8.2
100-22	9.2
200-22	10.1
25-24	5.9
50-24	6.9
100-24	7.8
200-24	9.1
300-24	10.1

Man Power Requirements

THE spring, summer and fall construction program should be sized up and an estimate of the total labor requirements made in order to determine whether or not by a proper scheduling of the work it can all be handled by existing construction forces, and if not, to determine the amount of additional help that may be needed. Table No. 3 which gives the labor requirements for various plant construction operations should prove useful in estimating the approximate man power requirements. These average units are based on small gangs and include truck driver and foreman, hence may seem somewhat high for the smaller companies.

Standard Practices

IN planning construction work it is generally a safe rule for the smaller companies to follow the construction practices of the larger groups. In this connection the following recommendations may prove helpful.

(1)—Adopt the lashed method of cable suspension for all new construction.

(2)—Standardize on compression type splices.

(3)—Use 24 or 26 gauge cable in preference to 22 gauge cable for small exchange cable plant.

(4)—Use drop wire clamps and clips in preference to porcelain knobs and tie wire.

(5)—Place an adequate number of terminals in each block.

Raytheon Votes to Acquire Belmont Radio

The Raytheon Manufacturing Co. called a special stockholders' meeting For April 5 to vote on a plan to acquire as a wholly owned subsidiary, a new corporation owning all the property and assets of the present Belmont Radio Corporation, which gives Raytheon a receiver and end-equipment manufacturing outlet for its tubes and other products. The new corporation will be formed under the name of the Belmont Radio Corp.

Raytheon then will acquire all the capital stock of the new corporation in exchange for 270,000 shares of Raytheon common stock. Raytheon stockholders also will be called upon to authorize an increase in the present outstanding common stock of their company by 270,000 shares. It is proposed to amend Raytheon's certificate of incorporation to have the total number of shares of authorized stock at 1,298,482 common shares with a par value of 50 cents a share and 140,000 shares of preferred with a $5 par value.

WHITNEY BLAKE

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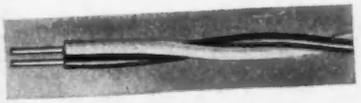
WELL BUILT
WIRES SINCE 1899

PLASTITE*
INSULATED WIRE

INSIDE, JUMPER, and DUCT

You will like this smooth, bright, extruded **PLASTITE** insulation, Because of these Features:—



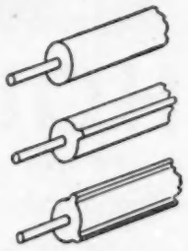
No. 22 Twisted Pair Inside, Brown or Ivory—22PN-2

No. 22 Triple Inside, Brown or Ivory— 22PN-3

No. 22 Twisted Pair Duct or Jumper, Black and Red— 22S-2

No. 22 Triple Duct or Jumper, Black, Red and Ivory— 22S-3

The above type can be furnished in 19 gage also.



THE RIDGE shown in the enlarged section is extruded on one leg of a twisted wire where both are the same color. This ridge makes tracing easy in darkness or in light. The third leg of a triple wire has two ridges.

* Reg. U. S. Pat. Office

1. Smaller Diameter, more wires in duct. Makes a neater job on inside wiring.
2. Colors are bright and permanent, easier to see.
3. Strips Cleanly and Easily.
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5. Trouble Proof Installations.
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7. Low Cost.

A TRIAL ORDER will convince you that this is the ideal Duct, Jumper or Inside Wire.

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The WHITNEY BLAKE Company
New Haven, Connecticut, U. S. A.

Kellogg Switchboard Holds Annual Meeting

The annual meeting of the stockholders of the Kellogg Switchboard and Supply Company was held March 27 at the company's office in Chicago. Directors re-elected to serve for the coming year were John J. Bryant, Jr., Curtis B. Camp, S. Ashley Guthrie, John P. Hooker, James H. Kellogg and James G. Kellogg.

President James G. Kellogg reported that the major portion of the plant's facilities were devoted to the production of communication equipment to our armed forces. Most of the equipment manufactured involved field telephones, switchboards and auxiliary equipment.

"Service to our regular customers in the telephone industry," reported Mr. Kellogg, "although curtailed since the start of the war has been continued to the best of our ability. Our customers are aware of the restrictions due to the war and the company appreciates their loyalty and good will."

James G. Kellogg

Mr. Kellogg discussed the research and development which has existed during the year, stating that this work was principally confined to new products for military uses and that much of this work will assist in producing better postwar equipment for their regular customers.

The company has maintained its plant in good condition by acquiring new tools and machinery where savings in cost of production warranted the investment.

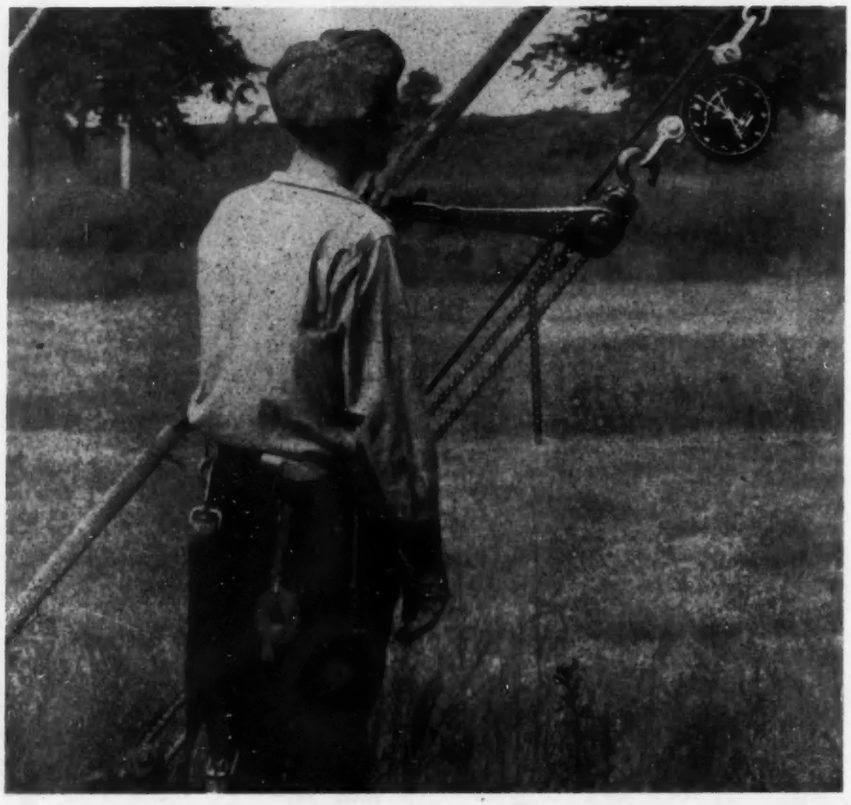
Mr. Kellogg further reported that the balance sheet as of December 30, 1944 disclosed a sound financial structure and a well balanced current position.

Regarding the prospects of 1945, President Kellogg stated that the back log of orders on hand had nearly doubled since the first of the year. Most of this volume constitutes communication equipment for military uses. In the event of a European victory this year, Mr. Kellogg suggested that the company's change-over to regular telephone customers' orders would necessitate only minor adjustments in operations as compared to other industries because much of the military equipment and apparatus now in production could be diverted to civilian requirements.

Following the stockholders' meeting, the board of directors reelected James G. Kellogg, president; James H. Kellogg, executive vice-president and secretary; H. C. McCluskey, treasurer; H. O. Edson, assistant treasurer and C. D. Manning, assistant secretary, for the ensuing year.

C. E. Eaby Re-elected President

At a recent meeting of the board of directors of the Denver & Ephrata (Pa.) Tel. & Tel. Co., C. E. Eaby was re-elected president. Other officers elected are Bertha Brossman, vice president; Monroe Lausch, secretary; and Fred Gross, treasurer.



QUALITY HOISTS

For every telephone construction and maintenance job there is a proper Coffing hoist. Whether it be pulling up cables, tightening guy wires or truck maintenance in the garage there is a Coffing Hoist that will do that lifting or pulling job easily, quickly and economically.

In your post-war plans don't forget to include a "Safety-Pull" ratchet lever hoist for every truck.

WRITE TODAY FOR CATALOG ZG-6

UTILITY MAINTENANCE TOOLS—RATCHET LEVER HOISTS

SPUR GEAR HOISTS—ELECTRIC HOISTS

COFFING HOIST COMPANY
Danville, Illinois, U. S. A.

Highlights of the Communications News

(Continued from page 59)

question the effect on the telephone service of permitting it to be operated by a company that is also rendering other and competing types of service."

3. The record of Press Wireless, the Assistant Secretary stressed, "seems to indicate the advantage of a high degree of specialization in this field (devoted exclusively to the press service) and to point to the desirability of leaving Press Wireless out of any merger that might be attempted."

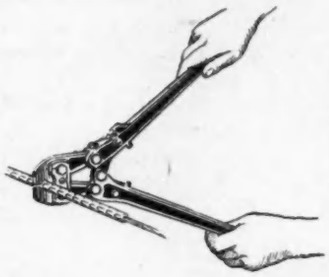
Army Can Contribute Equipment Throughout Globe

GENERAL INGLES pointed out that the greatest contribution which the military communications system can make to international commercial communications of the U.S. "is in the future availability of considerable quantities of equipment which may be used in the construction of a system, designed to service public communications." Some consolidation of international communications enterprises in the U.S. is desirable, Gen. Ingles told the subcommittee, citing that the War Department has a direct interest in international commercial communications from the standpoint of national defense and the fact that any international communications set-up will provide facilities to be used by the Army in the event of any future conflict. However, the War Department, he emphasized, does not feel competent to suggest the form and design of an international merger and believes that these factors should be determined by "those who would be responsible for the financial soundness of the organization and those familiar with the demands of the public and commerce for international communications." He added that "it follows from these beliefs that a voluntary merger should be encouraged."

The War Department, likewise, does not feel competent to comment on government control over monopolies and the regulatory controls which should be exercised by the FCC in event of a merger, Gen. Ingles declared. Such a determination must and should be made by Congress, he said. The problems of corporate structure, the role of submarine cables and press communications involve far-reaching considerations aside from any military aspects and the War Department "is not sufficiently concerned with these matters in its daily operations to express authoritative opinions."

TOOLS
TO SPEED LINE WORK

Shown below are some of the tools Graybar can supply to help you save time on line maintenance or essential construction jobs. For complete information about these and other linemen's tools, call the Graybar Telephone Specialist near you. *Graybar Electric Company, Graybar Building, New York 17, N. Y.*



FOR FASTER, SURER SPLICING — Nicopress sleeves and No. 51 splicing tool save time, reduce expense, and produce strong, tight, moisture-proof joints. One man can splice the wire — on the ground or on the poles. Each splice develops the full rated strength of the conductor.

PLIERS FOR ALL PURPOSES — Linemen favor Klein's pliers because of their firm grip, handy shape, powerful leverage, and keen cutting knives. GRAYBAR offers all types: long-nose, chain-nose, curved-nose, duck-bill, sleeve, cord-tip-closing, side-cutting, oblique-cutting, and end-cutting.

CLIMBERS THAT COMBINE COMFORT WITH SAFETY — Klein's No. 1939 linemen's climbers weigh only 2½ pounds per pair — less than ordinary styles. Yet they are amply strong, and every one has been tested. GRAYBAR also supplies Klein's climber straps, ankle straps, climber pads, and gaff guards.

SUPERSTRONG SAFETY STRAPS — "Klein-Kord" safety straps provide utmost protection. Each of six plies of specially woven, long-staple cotton yarn is laid in rubber and vulcanized. Snaps and buckles are galvanized, drop-forged steel, individually tested to withstand a 1500-pound pull.

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First Source of Telephone Supplies

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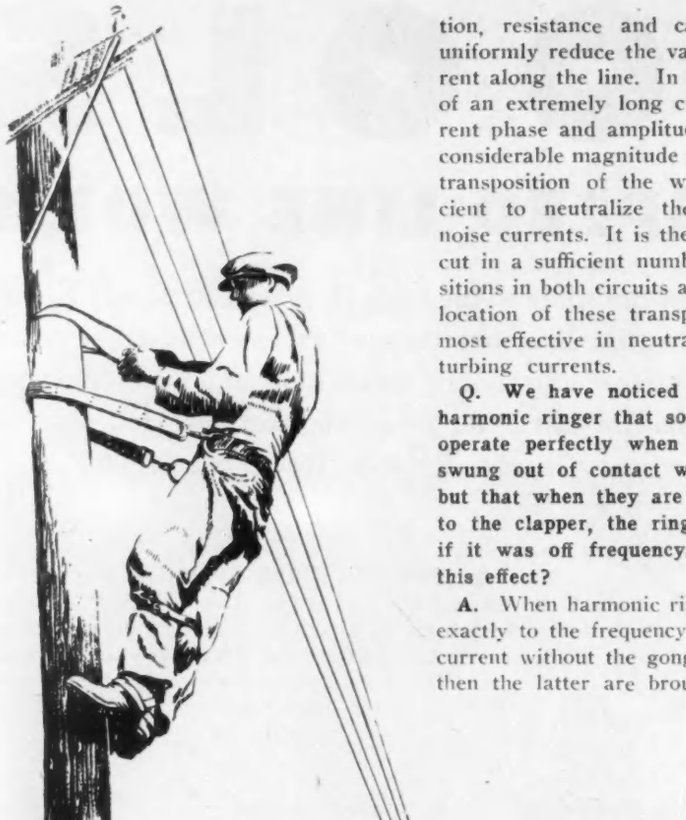

Edited By
J. S. REED, JR.

LINE and DESK

Q. We have been told that in the case of two paralleling circuits it is only necessary to transpose one of the circuits in its exact center to reduce noise or crosstalk. Yet we find this method seldom works in actual practice. What is the reason for this?

A. The reason for the failure of this transposition method to neutralize the crosstalk or noise circuits is the presence of phase change and attentuation in a telephone line of considerable length. A finite time is required for current to travel along the length of a telephone circuit, so that at any instant the voice or noise current has a different value from one end of the line to the other. In addition, resistance and capacity effects uniformly reduce the value of the current along the line. In the two halves of an extremely long circuit, the current phase and amplitudes differ by a considerable magnitude so that a single transposition of the wires is insufficient to neutralize the crosstalk or noise currents. It is then necessary to cut in a sufficient number of transpositions in both circuits and arrange the location of these transpositions to be most effective in neutralizing the disturbing currents.

Q. We have noticed in adjusting a harmonic ringer that sometimes it will operate perfectly when the gongs are swung out of contact with the clapper but that when they are brought closer to the clapper, the ringer will act as if it was off frequency. What causes this effect?

A. When harmonic ringers are tuned exactly to the frequency of the ringing current without the gongs in place and then the latter are brought in contact with the clapper, a slight "detuning" effect takes place due to the rebound of the clapper on striking the gongs. In properly designed ringers this does no harm since the electromagnetic field is always made strong enough to force the ringer armature in full vibration despite the detuning effect. Whenever trouble is experienced with detuning of the ringer, the spacing between each end of the armature and the pole piece opposite should be checked with a thickness gauge. The spacing should be exactly equal on each side. Care should be taken not to cause cross ringing by improper adjustment of this spacing. The permanent magnet should be strong enough to lift a 4½ ounce soft iron weight. If the adjustments or a recharging of the magnet does not improve the performance of the ringer, either the ringing current may be too weak or one or both of the ringer coils are partially shorted.

Q. What is the most effective method of topping a tree to provide clearance for an overhead line?

A. Figure 2 illustrates how a tree is "drop-crotched" to obtain overhead clearance. In this method, the top branches are cut back to the tree trunk and main limbs, leaving a number of branches at a lesser height to form the new crown. The tree crown is thus lowered several feet without materially changing the natural contour of the tree. This practice prevents the formation of a bushy growth that results when the tree is pruned to the same line at every trimming operation.

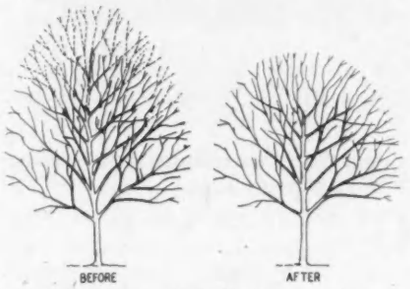

Fig. 1—"Drop-crotching" of a tree to provide clearance from overhead line. (Courtesy Edison Electric Institute.)

Q. Our installers and trouble men find a 4-foot step ladder almost indispensible for many of their jobs. What is your idea as to a suitable place for mounting this type of ladder on a maintenance car?

A. A certain telephone company has been using the step ladder rack arrangement (Figure 3) on their maintenance cars for several years. The rack is made from two parallel channels of 12 gauge steel mounted on strap iron supports back of the car cab to raise the rack sufficiently high to avoid obstructing the rear window of the cab. The channels are curved out at the ends to prevent chafing of the ladder when it is slid on or off the rack. A leather strap holds the ladder in position on the rack.

Fig. 2—Maintenance car equipped with 4-foot step ladder rack mounted behind car cab.

Errata

Certain erroneous statements were made in answers to two questions appearing in the February issue. In the interest of accuracy we wish to restate these questions with correct answers as follows:

When is a protector at the subscriber's station unnecessary?

A. According to the National Electrical Safety Code, Part 3, 5th Edition, telephone instruments connected to overhead circuits exposed to either lightning or to supply lines of more than 400 volts to ground, or induction of more than 150 volts between terminals of the telephone equipment, and ground from supply circuits under normal conditions should be protected by fuses and arrestors operating at 750 volts to ground. The National Electrical Code issued as pamphlet No. 70 by the National Board of Fire Underwriters, requires the use of an approved protector for each line of an aerial or underground entrance into a building when these lines are exposed to accidental contact with light or power conductors operating at a potential exceeding 250 volts, this protector to be located as near as possible to the entrance of the telephone lines into the building. Except in a few isolated cases, the supply lines are alternating current secondary circuits connected through transformers to primary lines operating at voltages much higher than 250 volts. These primary supply circuits are usually in the same general vicinity as the telephone lines to constitute an exposure for the latter. Hence a strict interpretation of the foregoing rules would indicate the need for a substation protector in each telephone line in the majority of cases. A protected building terminal for aerial or underground cable will solve the problem of adequate protection for so many lines in a small space.

Q. Why is it not permissible to use a ground wire of lighter gauge than No. 14 for station projectors?

A. The National Electrical Safety Code permits the use of a ground wire as small as No. 18 B. & S. copper, however considerations of mechanical strength make it necessary to use a larger size wire, such as No. 14 B. & S. for substation protectors on No. 6 B. & S. for pole mounted protectors where the loss of a ground connection through accidental cutting or breaking of the wire would result seriously in case of a lightning stroke or a power cross. The No. 6 wire also provides the additional current carrying capacity considered necessary for the number of protectors installed on the pole.

American

UTILITIES BODIES and EQUIPMENT DESIGNED and ENGINEERED FOR SERVICES and SATISFACTION

"AMERICAN" Telephone Rural Maintenance Body Model 4551 Length 70"

Model 4804 — American Body with Standardized General Utility Compartments.

Preferred Equipment By Communication Companies for Line Construction Maintenance and Installation

Some of the many reasons why "American" Bodies and Equipment meet most completely and economically the actual working conditions of the communication companies, proving real time and money savers, are: Correct Design . . . Superior Quality Construction . . . Strength . . . Endurance . . . Comfort . . . Convenience . . . Safety . . . Low Operating Costs, and Fine Appearance.

In most situations there's an "American" Standard Body that will meet all demands but at times conditions arise that call for special design and construction. In these cases American Engineers through wide experience are able to design bodies and equipment exactly fitted to your special requirements. The "American" line includes: Line Construction Bodies . . . Telephone Installation and Maintenance Bodies . . . Cable Splicers and Pole Trailers . . . Pole Derricks . . . Winches . . . Reels . . . Power Take-Offs and various other associated equipment.

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THE American COACH & BODY CO.

PUBLIC UTILITIES EQUIPMENT FOR MOTOR VEHICLES

Telephone Engineer
HANDBOOK TABLES

Index—Outside Plant Design
Date—April 15, 1945

Wire Clearances (Cont.)

THE requirements for increased minimum clearances discussed in the Handbook Tables for March 15, 1945 are based on certain complicated rules specified in Part 2 of the National Electrical Safety Code, Fifth Edition. To simplify these rules and provide a practical guide for most situations involving the crossing of a supply line over a telephone line, the following tables have been prepared for use in heavy loading districts where the span length of a crossing supply line is greater than 175 feet (or 150 feet for 3-strand supply conductors with individual wires .09 inch of an inch or less in diameter).

To determine the required minimum clearance under the foregoing conditions, use the following method:

1. Measure the span length of the upper crossing conductor and then the distance from the crossing point to the nearer pole supporting the upper conductor as shown in Figure 1.

2. Ascertain the size and type of supply conductors at the crossing from the power company and consult Table No. 6 to determine whether the conductors are large (A) or small (B).

3. Referring to Table No. 5, locate the section corresponding to the span length and under the first column locate the figure corresponding to the pole-to-wire-crossing distance, or the next higher figure if the measurement lies between two figures in this column.

4. Under the column heading corresponding to the type of supply wires at the crossing (service drop, messenger, or guys) and conductor size (A or B), the minimum required clearance for the particular crossing situation will be found.

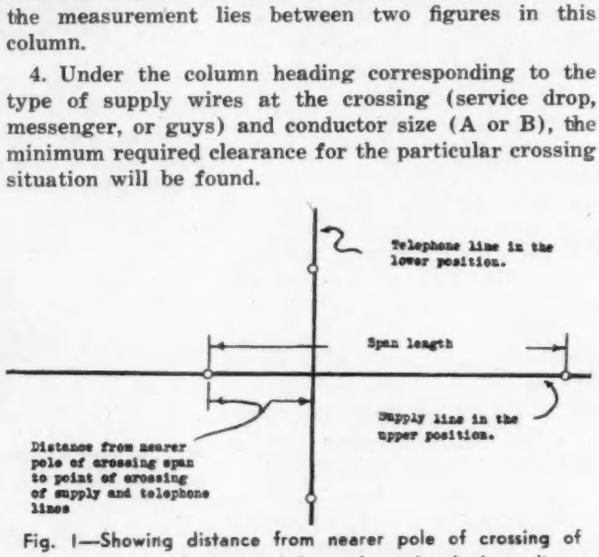
Telephone line in the lower position.
Span length
Supply line in the upper position.
Distance from nearer pole of crossing span to point of crossing of supply and telephone lines

Fig. 1—Showing distance from nearer pole of crossing of span to point of crossing of supply and telephone lines.

Table No. 6
Minimum Clearances Required for Span Lengths of Supply Lines Crossing Telephone Lines

Span Length of Crossing Supply Line (Note 1)	Distance from nearer support of crossing span to point of crossing in feet	Under Supply Service Drops Messengers and Guys		Minimum Clearance of Telephone Line: Over Supply Service Drops (Note 4)		Under Supply Wires: 0 to 8700 Volts (Note 3)		Under Supply Wires: 8700 to 50,000 Volts	
175 Feet:		2' 0"		4' 0"		4' 0"		6' 0"	
200 Feet:		A	B	A	B	A	B	A	B
	100'	2' 5"	2' 9"	4' 5"	4' 9"	4' 5"	4' 9"	6' 5"	6' 9"
	75'	2' 5"	2' 9"	4' 5"	4' 9"	4' 5"	4' 9"	6' 5"	6' 9"
	50'	2' 0"	2' 3"	4' 0"	4' 0"	4' 0"	4' 0"	6' 0"	6' 0"
	25'	2' 0"	2' 0"	4' 0"	4' 0"	4' 0"	4' 0"	6' 0"	6' 0"
225 Feet:									
	110'	2' 9"	3' 6"	4' 9"	5' 6"	4' 9"	5' 6"	6' 9"	7' 6"
	75'	2' 7"	3' 4"	4' 6"	5' 2"	4' 6"	5' 2"	6' 6"	7' 2"
	50'	2' 1"	2' 8"	4' 0"	4' 2"	4' 0"	4' 2"	6' 0"	6' 1"
	25'	2' 0"	2' 0"	4' 0"	4' 0"	4' 0"	4' 0"	6' 0"	6' 0"
250 Feet:									
	125'	3' 2"	4' 3"	5' 2"	6' 3"	5' 2"	6' 3"	7' 2"	8' 3"
	75'	2' 10"	3' 10"	4' 8"	5' 8"	4' 8"	5' 8"	6' 7"	7' 7"
	50'	2' 3"	3' 0"	4' 0"	4' 3"	4' 0"	4' 3"	6' 0"	6' 5"
	25'	2' 0"	2' 0"	4' 0"	4' 0"	4' 0"	4' 0"	6' 0"	6' 0"

Note 1. Figures in column "A" are minimum clearances for large supply conductors while those in column "B" are for small supply conductors. See Table No. 7 for classification of these conductors. (Table No. 7 will appear in the May 15 Telephone Engineer Handbook Tables.)

Note 2. For 3-strand conductors with wires .09 inch or smaller (copperweld 8A, 9½D, 3-No. 12 and Amerductor No. 12) the clearances shown in the table are for spans 25 feet shorter.

Note 3. When a supply line of 750 to 8700 volts crosses over a telephone line within 6 feet horizontally of a telephone pole, the basic clearance shall be 6 feet instead of 4 feet.

Note 4. Minimum permissible clearance to depend on length of telephone span crossing over supply service drop.

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Both spring drive model No. 6 and electric drive model No. 33 Calculagraphs were designed specifically for telephone toll central office service.

Year after year these dependable instruments continue to be used for furnishing the essential time data for charging long distance calls. They furnish the net used time accurately, are simple of operation and have proved reliable for a service that requires the utmost in performance.

Calculagraphs are being used by the principal telephone systems throughout the world.

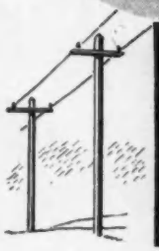
Model 33

CALCULAGRAPH CO.

ESTABLISHED 1892

310 SUSSEX ST. HARRISON, N. J.

Sure, this strand rusted BUT...



After 27 years of service, subjected to the highly corrosive winds that blow between the Atlantic Ocean and Long Island Sound, only the surface of this steel strand was affected. The wires, as shown by these two typical photomicrographs, are corroded. The physical strengths of these strands are still above the minimum rated strengths for the grades. The line will continue in service indefinitely.

THIS is typical of the performance records rolled up by Amerstrand Steel Strand—the result of exact engineering and metallurgical control of the metal and methods throughout every processing step.

The extent of corrosion, shown above, did not impair tensile strength. Extra tough, hard steel defies abrasion and vibration fatigue. Improved tieing methods and devices minimize both these destructive factors. The galvanizing process used in making Amerstrand Steel Strand insures maximum protection of the steel from the elements.

Whether you need guy lines, messenger cable, or overhead ground or static wire for lightning protection, there is a type of Amerstrand Steel Strand that has been *engineered* to more than meet your needs.

The combination of Amerstrand Steel Strand, Amertel Telephone Wire, and advanced tieing methods—which reduce vibration and prevent abrasion—means fewer line breaks, greater efficiency and lower "over-all" cost for outside plant operators.

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Highway equipped line construction and maintenance trucks provide the utmost in efficient and durable service.

Highway bodies, winches, power take-offs, pole derricks, towing hooks, power reels and other kindred items that properly complete a line construction and maintenance truck are all designed to associate and operate efficiently with each other.

The design and construction of each item, from the winch line hook to the body proper, reflect the technical knowledge of many utility equipment engineers and the experience of operating crews in every section of the country.

The selection of only the best of materials for the purpose, combined with skilled workmanship gained through years of manufacturing practice, assures light weight, strength and high factors of safety—features that are characteristic of Highway public utility equipment.

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LIGHTWEIGHT ALL-METAL

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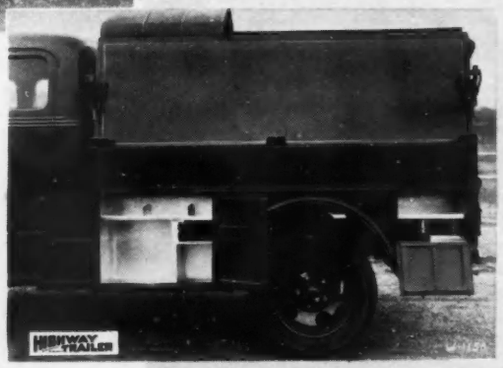
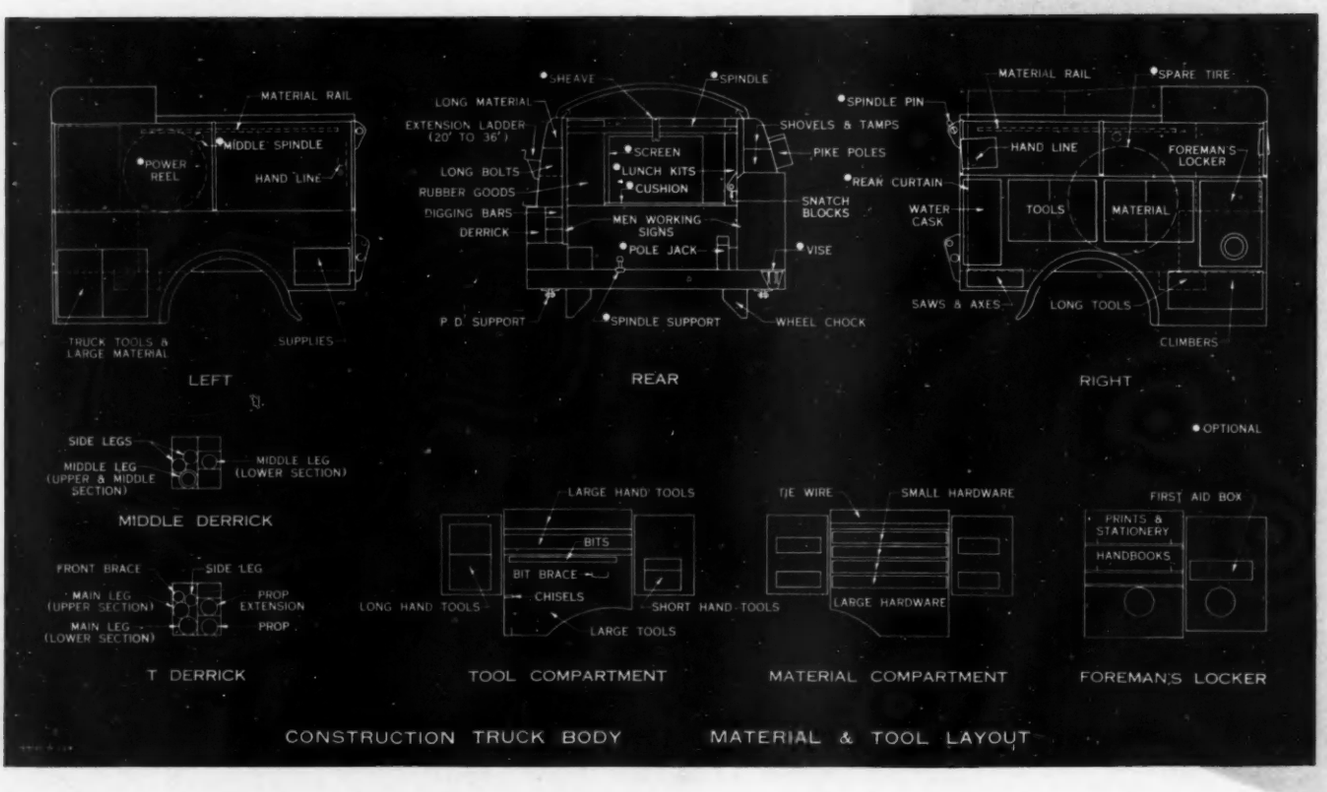
Light weight, rugged construction and durability are dominant features of a Highway Line Construction and Maintenance Body. Other features include the full vision telescoping roof, use of rust-resisting metal in the cabinets and panels, full panel front with enclosure between body and cab and the "firm tread" all-steel floor.



Large platform loading space with roomy tool and material compartments, all designed and arranged to efficiently serve construction and maintenance crews.



RUGGED CONSTRUCTION

STANDARD EQUIPMENT

Included with Standard Body

1. "B" Eye Bolt
2. Ladder Clamps
3. Telescoping Roof
4. Spindle Bar Brackets
5. Safety Hook
6. Material Rails
7. Pole Derrick Hinges
8. Pole Derrick Support Hinges
9. Derrick Hold Down Clamps
10. Wheel Chock Carrier
11. Digging Bar Rack
12. Vertical Clothes Locker
13. Locking Door Handles
14. Ladder Seats

★

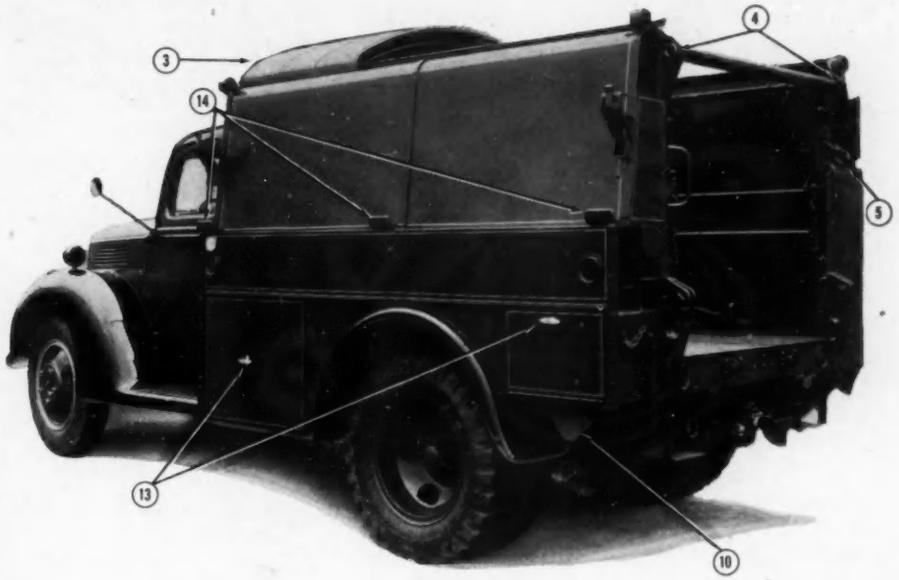
OPTIONAL EQUIPMENT

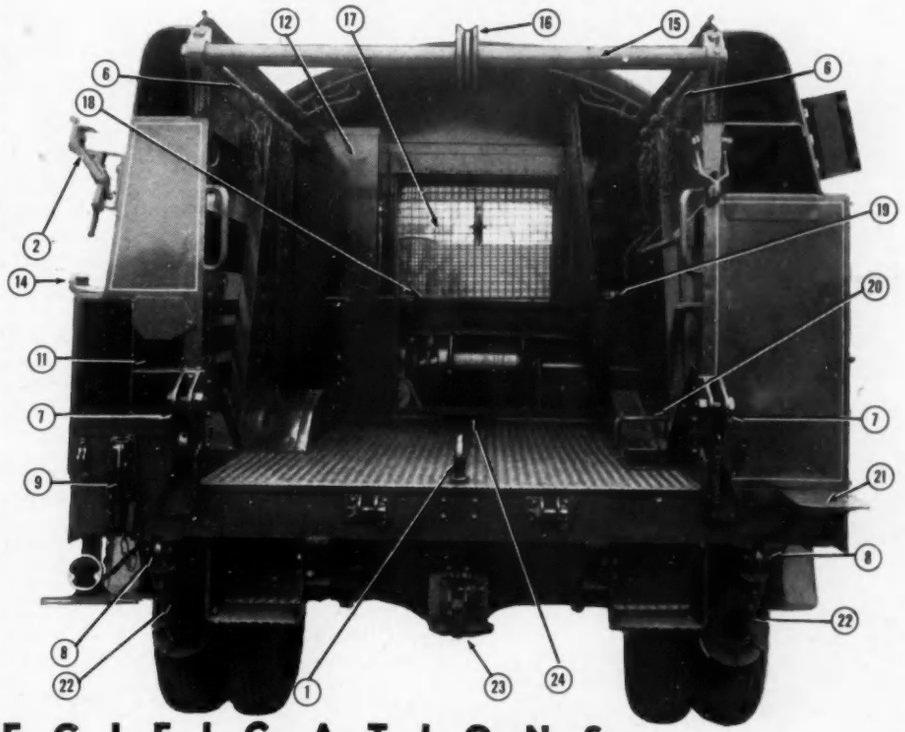
Specify when ordering

15. Spindle Bar
16. Spindle Bar Sheave
17. Sliding Window or Screen Enclosure
18. Winch Seat Cushion
19. Power Reel Carrier
20. Pole Jack Carrier
21. Vise Bracket (Detachable)
22. Pole Derrick Supports
23. Towing Hook
24. Middle Leg Pole Derrick Bracket

Rear Curtain (Not Illustrated)

Rubber Goods Box (Not Illustrated)





SPECIFICATIONS:

BODY TYPE	LCW-102	MCW-115	HCW-127
Length of Body	102"	115"	127"
Width of Body	86"	90"	90"
Height—Platform to Top of Roof	62"	62"	62"
Height—Platform to Top of Panels	52 1/8"	52 1/8"	52 1/8"
Average Height—Ground to Platform	33 1/2"	36 1/2"	38 1/2"
Width of Platform Between Cabinets	60"	64"	64"
Width of Cabinets—Upper Left	12"	12"	12"
Upper Right	14"	14"	14"
Lower Left	18"	19"	19"
Lower Right	18"	19"	19"
Length of Platform (winch seat to rear)	79 1/2"	92 1/2"	104 1/2"
Weight with all Optional items (approximate)	2335 lbs.	2682 lbs.	2890 lbs.

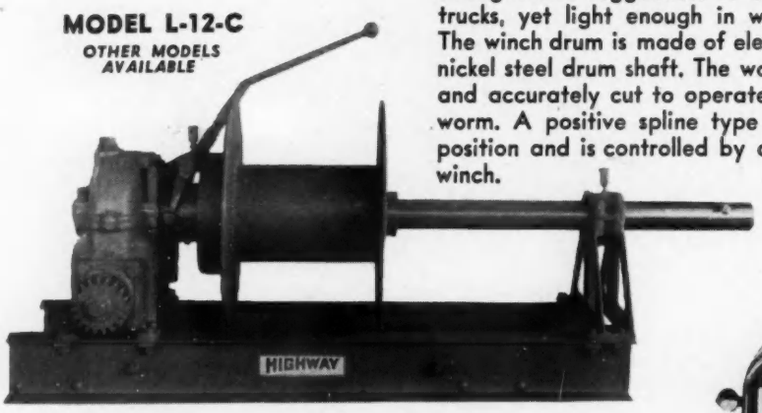
SMALL • • COMPACT • • DURABLE • • •

HIGHWAY

SINGLE DRUM WINCHES

FOR USE WITH MIDDLE TYPE POLE DERRICKS

MODEL L-12-C
OTHER MODELS AVAILABLE



The Highway Model L-12C winch is a small, free drum type, with ample strength and ruggedness to operate safely and efficiently on heavy-duty trucks, yet light enough in weight for use with 1½ and 2 ton chassis. The winch drum is made of electric cast steel and is mounted on a chrome nickel steel drum shaft. The worm wheel is of manganese bronze, carefully and accurately cut to operate smoothly with the nickel steel drop forged worm. A positive spline type clutch locks automatically in the engaged position and is controlled by a lever mounted either in the cab or on the winch.

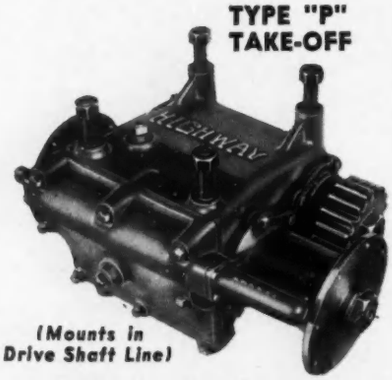
Automatic worm brake mounted on a worm shaft prevents overhauling.

SPECIFICATIONS

Length of Drum	12"
Diameter of Drum	8"
Diameter of Drum Flanges	19"
Cable Capacity (7/16" cable)	800'
Pulling Capacity	10,000 lbs.
Weight	470 lbs.

POWER TAKE-OFFS

TYPE "P" TAKE-OFF



(Mounts in Drive Shaft Line)

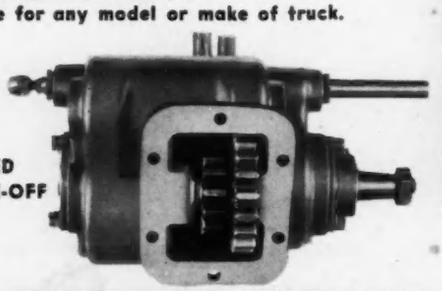
Highway Type P power take-off mounts in the drive shaft line directly behind the truck transmission. All of the speeds of the truck transmission are used to drive the winch in either the forward or the reverse direction. This feature is of tremendous advantage, providing slow speeds for heavy loads and high speed for lighter work.

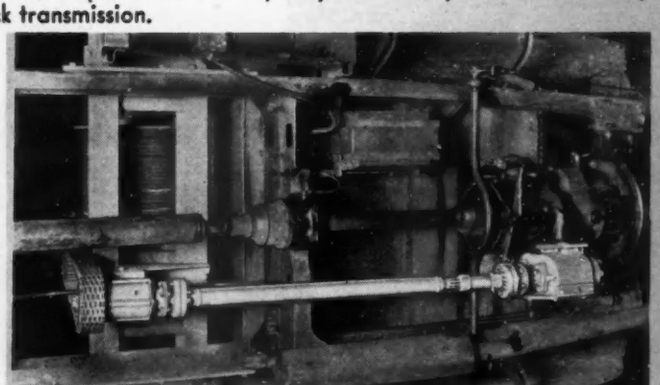
The housing of the Type P power take-off is made of electric steel and the gears of chrome nickel steel carefully heat treated. All shafts and gears are mounted on anti-friction bearings.

The three-speed power take-off (2 speeds forward—one reverse) is a sturdy, reliable unit that provides all the speeds to the winch that are required for average winch operation. It is quickly and easily installed on any standard truck transmission.

Attaches to the SAE opening on the side of the truck transmission.
Easily and quickly installed.
Available for any model or make of truck.

THREE SPEED POWER TAKE-OFF





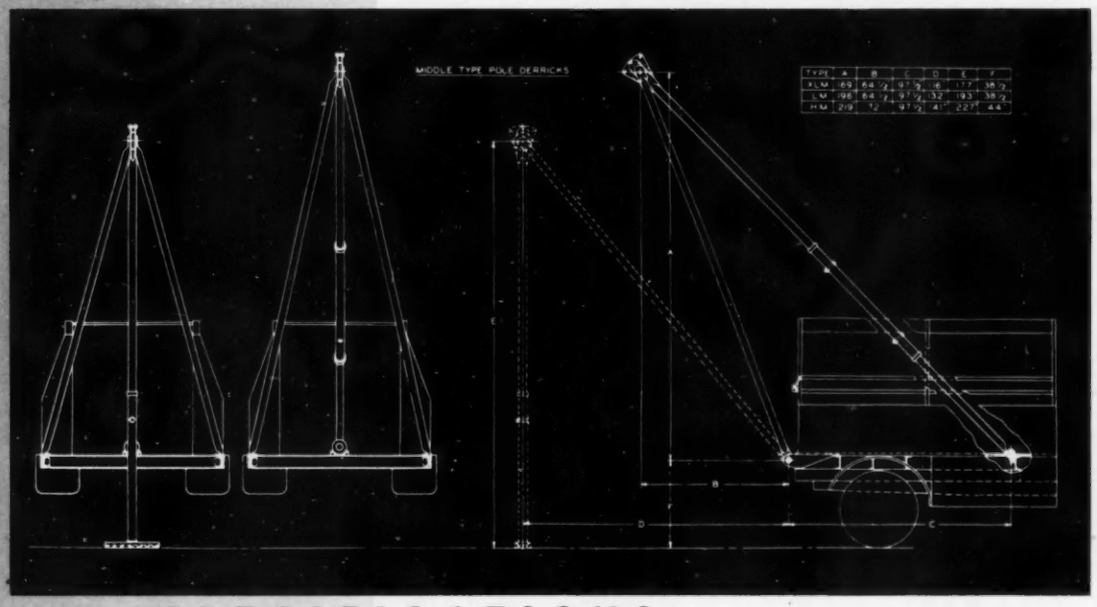
TYPICAL INSTALLATION OF THREE SPEED POWER TAKE-OFF

MIDDLE TYPE POLE DERRICKS

FOR USE WITH SINGLE DRUM WINCHES

Highway middle type pole derricks are accepted as standard by many utility organizations. They are available in two sizes—the IM for use with 1½ and 2 ton trucks will handle 45' to 50' poles and the HM for use on larger trucks will set poles 50' to 60' in height.

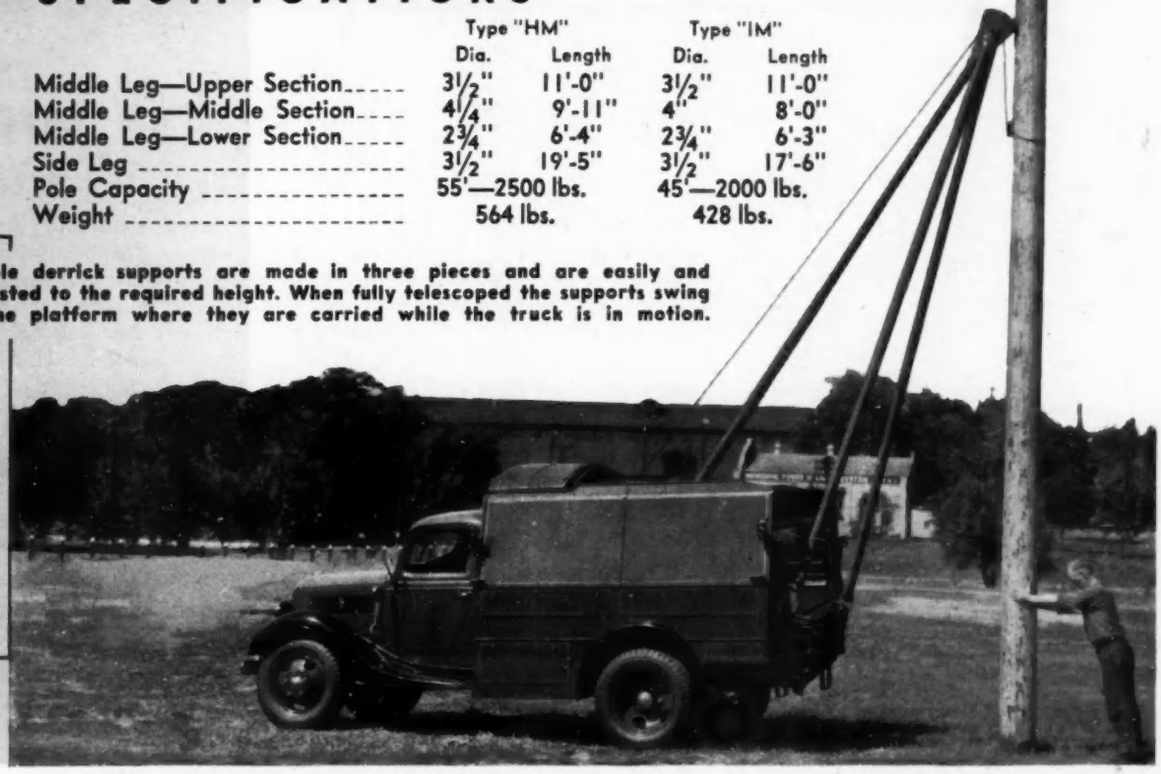
The derrick legs are made of special alloy seamless and heat treated steel tubing to secure light weight combined with strength and safety. The middle leg is made in three sections, permitting height adjustment of the derrick head and also permitting its use as a prop for pulling poles.



SPECIFICATIONS

	Type "HM"		Type "IM"	
	Dia.	Length	Dia.	Length
Middle Leg—Upper Section	3½"	11'-0"	3½"	11'-0"
Middle Leg—Middle Section	4¼"	9'-11"	4"	8'-0"
Middle Leg—Lower Section	2¾"	6'-4"	2¾"	6'-3"
Side Leg	3½"	19'-5"	3½"	17'-6"
Pole Capacity	55'—2500 lbs.		45'—2000 lbs.	
Weight	564 lbs.		428 lbs.	

The MC pole derrick supports are made in three pieces and are easily and quickly adjusted to the required height. When fully telescoped the supports swing up under the platform where they are carried while the truck is in motion.

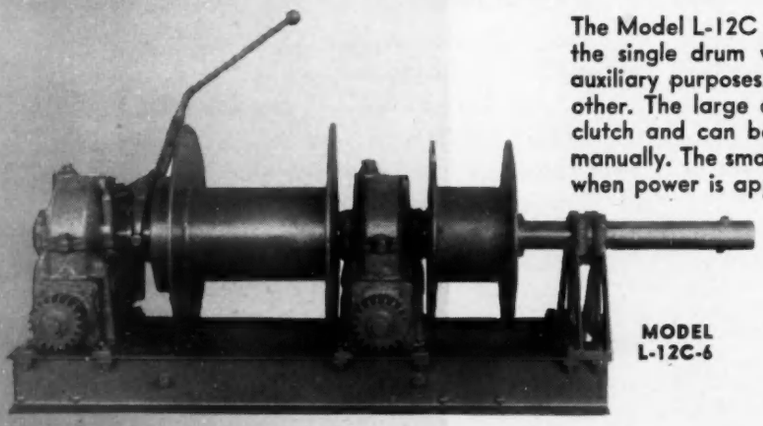


CONTROLS LOAD LINE AND BOOM LINE...

HIGHWAY

DOUBLE DRUM WINCHES

FOR USE WITH TYPE T-45 POLE DERRICK



MODEL L-12C-6

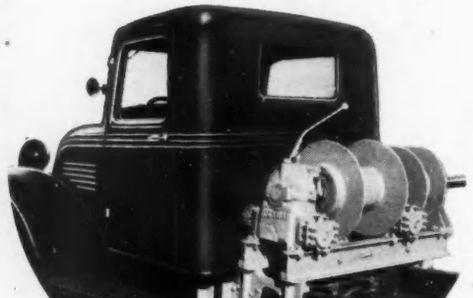
The Model L-12C double drum winch has all the advantages of the single drum winch as well as having an extra drum for auxiliary purposes. Each drum operates independently of the other. The large drum is provided with a positive spline type clutch and can be used as a free spool for pulling cable off manually. The small drum is of the fixed type and operates only when power is applied.

When used with the T-45 pole derrick the line from the small drum is attached to the derrick head and controls the position of the derrick. The line from the large drum lifts the load.

Each drum is equipped with an automatic worm brake that prevents overhauling and provides additional safety in operation.

SPECIFICATIONS

Length of large drum		12"
Length of small drum		8"
Diameter of each drum		8"
Diameter flanges—large drum		19"
small drum		16"
Cable Capacity	large drum (7/16" cable)	800'
	small drum (7/16" cable)	200'
Pulling capacity each drum		10,000 lbs.
Weight		710 lbs.



TYPE P-2-LL

(Drives Both Drums)

★

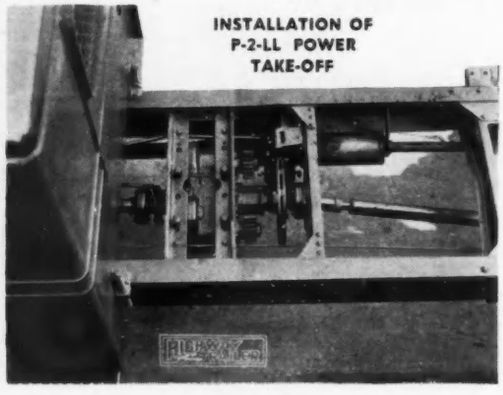
DUAL DRIVE POWER TAKE-OFF

FOR USE WITH DOUBLE DRUM WINCHES

The Type P2LL power take off is a dual purpose unit that mounts in the drive shaft line of the truck directly behind the transmission and is equipped with two output shafts for driving double drum winches or one winch and air compressor or any two devices requiring separate drives. All of the speeds of the truck transmission may be used for either drive and in either the forward or the reverse direction. This permits exceptionally slow speeds for heavy loads and high speeds for lighter work.

The housing of the Type P2LL power take off is made of electric steel and the gears of chrome nickel steel carefully heat-treated. All shafts and gears are mounted on anti-friction bearings.

Highway propeller shaft power take offs deliver the full power of the engine to the winch.



INSTALLATION OF P-2-LL POWER TAKE-OFF

TYPE T-45 POLE DERRICK

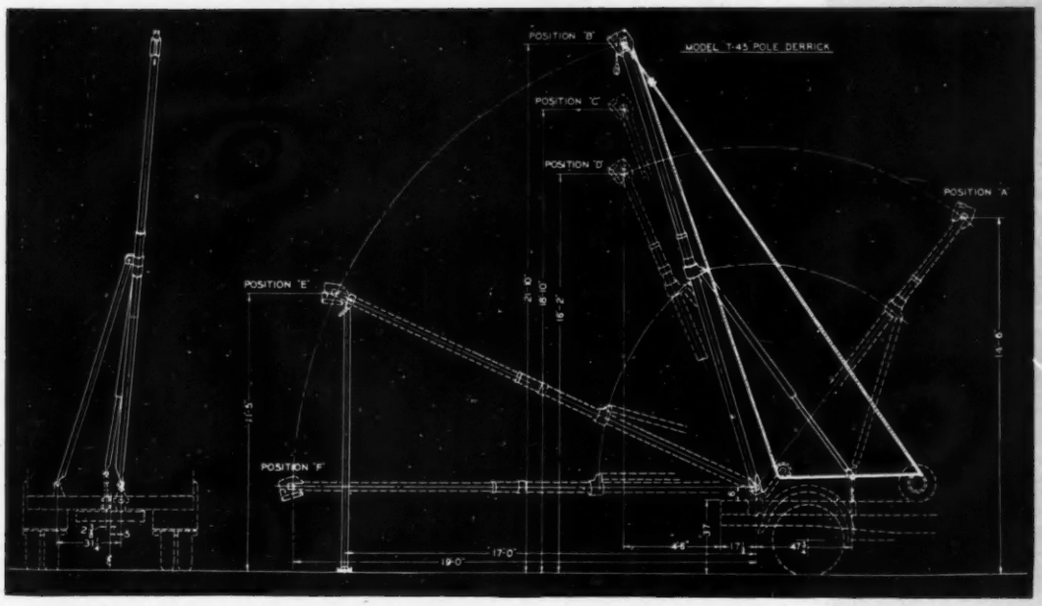
FOR USE WITH DOUBLE DRUM WINCHES

HIGHWAY

REDUCES MANUAL LABOR

The Highway Type T-45 pole derrick is controlled by the truck operator in the cab through the manipulation of the double drum winch. On low leads the derrick is lowered by power while the truck is backed into position and then raised by power to the required height between or beyond the wires.

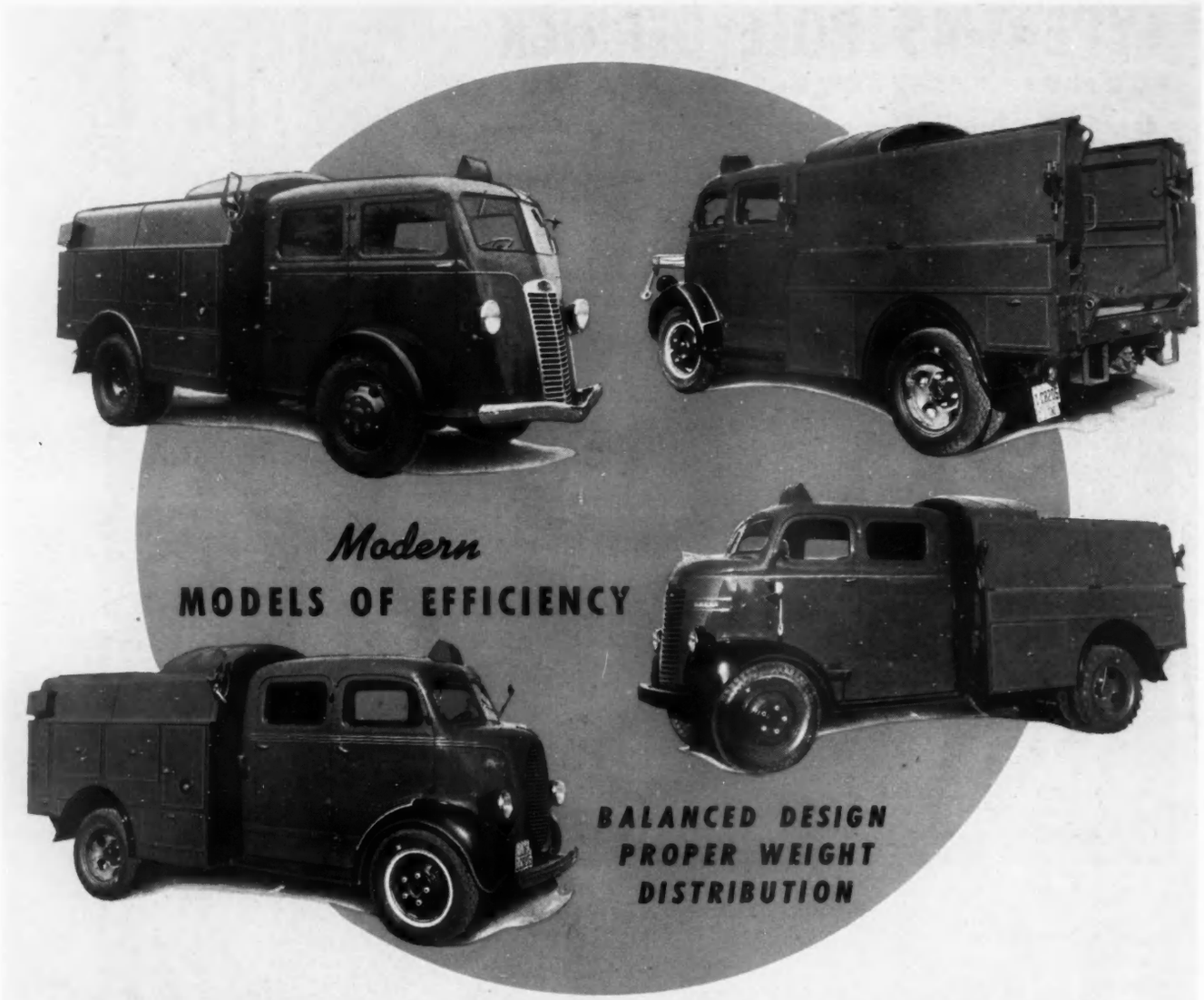
A special seamless and alloy heat-treated steel tubing is used in the construction of the Type T-45 pole derrick insuring a combination of maximum strength and light weight as well as a high factor of safety.



Specifications	Outside Diameter	Length
Main leg—upper section	4"	10'-5½"
Main leg—lower section	4½"	11'-2"
Side leg	3"	10'-1"
Front brace—upper section	2¾"	6'-6½"
Front brace—lower section	2"	4'-6¼"
Front brace spring	2"	6'-0"
Pole capacity	Average hgt. 55 ft.—Approx. wt. 3,200 lbs.	
Weight	Approx. 510 lbs.	

TYPE "C" WINCH ROPE HOOK

A drop forged hook with ample strength for any average pulling or lifting job. It is quickly secured around the pole for erecting or pulling.



Balanced design and proper installation assures equal weight distribution essential to efficient truck operation. Comfort and convenience for the crew induces better workmanship. Highway public utility equipment provides these essentials.

HIGHWAY TRAILER COMPANY

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TRUCK TRAILERS AND BODIES • EARTH BORING MACHINES • WINCHES • OTHER PUBLIC UTILITY EQUIPMENT

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Texas Telephone Association Board of Directors' Meeting

THE Texas Association considered a great number of subjects through their Board of Directors' meeting, in Dallas at the Baker Hotel, March 27.

Present officers re-elected at the meeting are as follows: Oscar Burton, Tyler, president; Sam H. Shutt, Sherman, 1st vice president; R. E. Fairly, Lubbock, 2nd vice president; Jean Shotwell, Lufkin, treasurer; Gertrude Tucker, Austin, acting secretary.

The executive committee elected is as follows: Oscar Burton, Tyler, ex-officio member; Sam H. Shutt, Sherman; R. B. Fairly, Lubbock; W. L. Prehn, Dallas; D. T. Strickland, Brownwood.

The main order of business was Rural Telephone Legislation, and after a full discussion of the pending federal rural telephone legislation, on motion by Director D. T. Strickland, seconded by J. Y. Rust, the Board of Directors went on record as adopting the following motion: "We concur in conclusions reached in the meeting of the Board of Directors of the United States Independent Telephone Association on March 15th in Chicago, Illinois, and pledge full cooperation to the said committee in attaining its objectives."

Prior to this meeting of the directors, those whose terms expired this year had been elected by the telephone membership of the association by mail ballot. The meeting of the Texas Association directors was double in purpose, to discuss subjects dealing with the operation of the association during the year and important problems in the telephone field, as well as to elect officers for the ensuing year. Since the annual meeting of the association was postponed this year, in accordance with the Byrnes' no convention appeal the Board of Directors' meeting was of necessity broad of scope, and lasted a full day.

The directors' luncheon in the Texas Room of the Baker Hotel was highlighted by the presentation of a Certificate of commendation to the Telephone Industry of Texas, for outstanding meritorious service in civilian protection of the state when the air raid warning signal system was set up during World War Two. Gertrude Tucker of the Association accepted the certificate and made the acceptance speech.

The following directors were present for this first meeting of the year: Fabian Bearden, Baird; Oscar Burton, George M. Johnson, Santa Anna; R. S. Martin, Houston; W. L. Prehn; A. L. Robb, Electra; John Y. Rust, San Angelo; H. T. Shipman, Pecan Gap; Jean Shotwell; Sam H. Shutt, Ralph Sparks, Pecos; D. T. Strickland, J. E. Stuart, Texarkana; W. P. Donaldson, Dallas; Fred C. Trower, Corsicana; and Gertrude Tucker.

Texas State War Council

Certificate of Commendation

To The Telephone Companies Serving the State of Texas

For outstanding meritorious services in Civilian Protection of the State of Texas during the Second World War

Chairman Police Mobilization

Governor of the State of Texas and Chairman of the War Council

The Texas Association is justly proud of the Certificate of Commendation presented by Colonel Homer Garrison for Governor Coke Stevenson to the telephone companies of the State of Texas for their part in the development of the state air raid warning signal system.

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Dan'l H. McNulty, Manager
Rogers Park Station, Chicago 26

Radio Course For Telephone Men

(Continued from page 44)

given instant the voltage would be zero at the input and output ends of the line but at the one-fourth and three-fourths points it would be 100 volts. The maximum peak output voltage of the generator is assumed to be 100 volts. It should be appreciated that one-fourth cycle later than shown in the illustration the voltage at the input and output ends of the line would be maximum while at the one-fourth and three-fourths points it would be zero.

This same situation exists on a telephone line but because of the long wave length (approximately 177 miles for 1000 cycle voice frequency currents transmitted over open wire) it does not seem so unusual.

Do not confuse the phenomena just discussed with *standing waves.* This latter effect refers to reflection effects which take place on antenna systems and feeder lines and which cause points of maximum and minimum voltage and current along the lines which do not (in effect) go through a cyclic change but remain at some fixed value. Standing wave phenomena will be discussed in a later section of this training course.

(Part 1 of Chapter 2 will appear in the May 1 FORTNIGHTLY TELEPHONE ENGINEER.)

HELP WANTED—MALE—Con.
HELP WANTED—MALE—Con.
HELP W
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Examination Questions
Chapter 1—Radio and the Telephone Business

1. List the five potential uses of radio channels in the telephone field.
2. Would rural radio service be offered on "party line" or "individual channel" basis?
3. What are the two proposed types of Common Carrier Mobile Radio Telephone Service?
4. Describe some of the uses of Emergency Radio Telephone Service.
5. What is the probable spacing between relay points in connection with Long Haul Toll Radio Telephone Channels?
6. Explain what is meant by the term *line of sight transmission path.*
7. State the band of frequencies implied by the term ultra high (UHF) frequencies.
8. It is proposed that rural radio telephone service be rendered on frequencies as low as 44 megacycles. What is the wavelength in feet at this frequency?
9. Note two outstanding characteristics of the frequencies above 300 megacycles.
10. Compute the combined height (in feet) of transmitting and receiving antennas required to give a line of sight transmission path between two telephone offices 20 miles apart and located in level country.

Mail all examinations direct to Lincoln Engineering School—Box 931—Lincoln, Nebraska. Include 6c in stamps to cover return mailing costs.

Kellogg Representative Dies

Many telephone people throughout the east, particularly in New York State deeply regretted the recent death of H. B. Dudley, 62, New York representative of the Kellogg Switchboard and Supply Company, Chicago, for 38 years.

H. B. Dudley

He attended Kentucky State University where he majored in engineering and later took a specialized course in Telephony at Armour Institute, Chicago. Since then, Mr. Dudley's major interest had been centered in the Independent telephone field, where he was widely known and respected.

USITA Happenings

Oscar Burton, president of the Texas Telephone Association and general manager of the Gulf States Telephone Co. of Tyler, Texas, last fortnight was appointed by the USITA Executive Committee as chairman of the association's Committee on Rural Telephone Legislation. He takes the place of Carl D. Brorein, president of the Peninsular Telephone Co. of Tampa, who found it impossible to continue as chairman because of other activities but is remaining on the committee as a member. The committee membership is soon to be enlarged, USITA headquarters indicated.

With the enlargement of the Rural Telephone Legislation Committee authorized by the USITA Board of Directors in Chicago last month, Clyde Bailey, executive vice president, reports that the other members of the committee are now: Harold V. Bozell, president of the General Telephone Corp.; F. S. Barnes, vice-president of the Rock Hill (S. C.) Telephone Co.; W. B. Clay, manager of Hutchinson (Minn.) Telephone Co.; Minor Corman, president of the Alabama Independent Telephone Association; D. O. Hood, president of the Columbia Utilities Co. of Oregon; and Samuel Tucker, president of the Pleasanton (Kansas) Telephone Co. Frank Bohn, president of the Home Telephone & Telegraph Co. of Fort Wayne, Ind., has withdrawn from the committee.

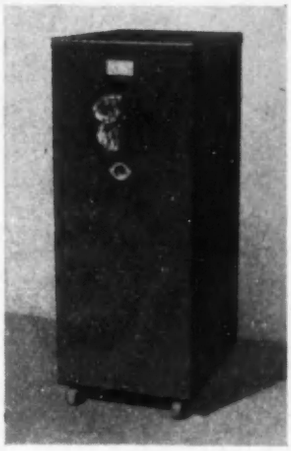
Leon F. Roberts, chairman of the Advertising Committee, reports their committee will hold its next meeting at the Hotel LaSalle in Chicago, April 30.

Immunity From Inductive Interference Suits

A bill recently passed by the North Dakota legislature, to become effective July 1, gives a substantial immunity to power companies against suits by telephone cmpanies for damage to telephone lines caused by inductive interference, reports Clyde S. Bailey, executive vice president of USITA in his member letter No. 85. The bill provides that in the absence of negligent construction or operation of power facilities, the operators of power lines shall not be required to bear any part of the cost of correcting inductive interference. The bill was sponsored by REA Co-ops. We understand that a similar bill was introduced in the South Dakota legislature but died in committee.

Chemical Dehydrators

Automatically controlled for preventing dampness in automatic telephone exchanges.



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In addition American Beauty Irons have many other features which make them mighty handy to have around—regardless of the size of your soldering job.

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A·B·CHANCE CO. CENTRALIA MISSOURI

Helpful Kinks For Plant Men

(Continued from page 35)

apparatus. There are occasions when it may be desirable to determine the 1,000 cycle impedance of some piece of telephone equipment as for example a telephone receiver, a ringer, a retard coil, etc. The impedance of electrical apparatus is normally measured by means of the relatively expensive and

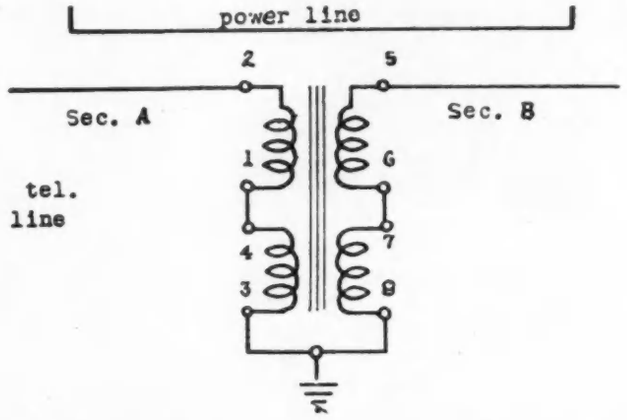

Fig. 10—Use of repeating coil for transposing grounded lines.

complicated **impedance bridge.** A simple method that is sufficiently accurate for most purposes consists in connecting the equipment under measurement in series with a variable radio type resistance having a range of from 0 to 50,000 ohms and then connecting these two series of connected items to the terminals of a 1,000 cycle oscillator.

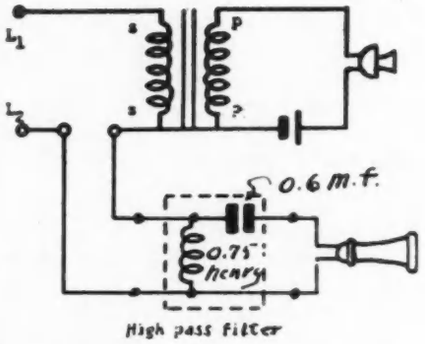

Fig. 11—High pass filter arrangement used to reduce noise from lower harmonics.

A rectifier type voltmeter is used to measure the voltage drop across the variable resistor and the item under test. The variable resistor is adjusted until it gives the same voltage

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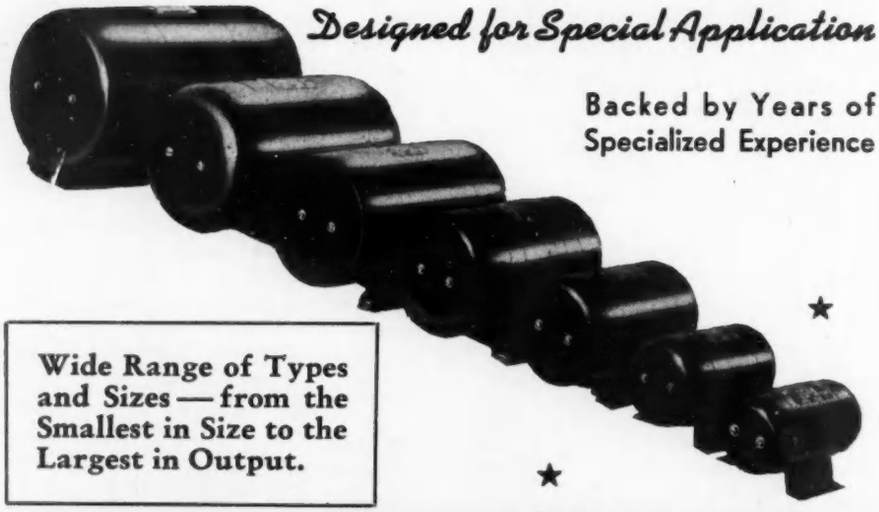

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drop as the apparatus under test. The unknown impedance is then determined by simply measuring with a D. C. ohmmeter the resistance of the variable resistor under the setting obtained when equal voltage drops occurred across both the variable resistor and apparatus under test.

Remedies for Inductive Interference

TELEPHONE companies often receive complaints from subscribers on rural lines because of high inductive noise levels. This is particularly true of grounded rural lines. When in spite of all that can be done the noise level is still high and something must be done to placate a complaining subscriber, one remedy that has been applied with fair success is the use of a high pass filter in the receiver circuit. The high pass filter is so designed that it greatly attenuates frequencies below 500 cycles but allows the higher voice frequencies to pass into the receiver with minimum attenuation. Thus the power noise due to the lower harmonics such as the third, fifth and seventh will be greatly reduced.

Although the voice will not sound as natural when the filter is used, nevertheless conversation can be carried on without difficulty The constants for such a filter and method of connection are shown in Fig. 11. Somewhat similar results can be obtained by punching a one-quarter inch hole in a receiver diaphragm as shown in Fig. 12.

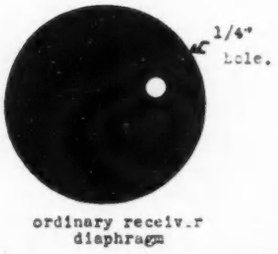


Fig. 12—Special high pass receiver diaphragm for reducing inductive interference. (Hole to be located about 0.66 inches in from edge.)

Some relief from severe inductive parallels involving grounded lines has been obtained by the use of a repeating coil type transposition which is placed in the grounded line at about the midpoint of the parallel as shown in Fig. 10. This acts in much the same manner as a transposition provided it is connected exactly as shown.

HANG THE LOAD ON HUBBARD HARDWARE
Distributed by 172 Leading Electrical Jobbers located throughout the U. S.
"There is One Near You!"
HUBBARD
HUBBARD AND COMPANY
PITTSBURGH . . . OAKLAND CALIFORNIA . . . CHICAGO
MANUFACTURERS OF A COMPLETE LINE OF HARDWARE
FOR TELEPHONE REQUIREMENTS SINCE 1900

Still plugging an important message

Telephone advertising has many wartime jobs. . . . Such as reminding telephone users why "Long Distance" sometimes asks them to limit their calls to five minutes.

The advertisement on the opposite page, appearing in national magazines during April, asks public understanding and co-operation for the whole telephone industry.

AN ADVERTISEMENT OF THE BELL TELEPHONE SYSTEM

"GETTING things done 'til the war is won" is still the big job of Long Distance.

Sometimes there's a particularly heavy load on certain circuits, as many busy hands reach for the telephone all at once.

Then the operator will ask your help by saying—"Please limit your call to 5 minutes."

BELL TELEPHONE SYSTEM

LISTEN TO "THE TELEPHONE HOUR" EVERY MONDAY EVENING OVER NBC

HEMINGRAY INSULATORS

Favorably Known Since 1870

HEMINGRAY NO. 10 —
The exchange line pony with double groove. Standard on many telephone lines.

PRECISE LABORATORY CONTROL

Hemingray Insulators are made as you would like to have them made. Under exacting laboratory control!

Every batch of glass—every lot of insulators is checked *hourly*, with various precision instruments.

That's why shipments of Hemingrays are uniform in quality. They're all "Firsts"—no "Seconds"!

Hemingrays are sold by principal jobbers and are manufactured by Owens-Illinois, Hemingray Division, Muncie, Indiana.

OWENS-ILLINOIS
HEMINGRAY INSULATORS
Telephone-Telegraph
Export Agents: International Standard Electric Corporation, New York City

Stromberg-Carlson Annual Report

The all-time company volume of business in 1944 of the Stromberg-Carlson Company delivered a net profit of 16% higher than in 1943, it is disclosed by Wesley M. Angle, president.

At the annual meeting held March 22, the company's report presented by Mr. Angle showed that company sales during the year amounted to $55,140,213 with due provision for renegotiation, an increase of more than 34% over the $40,946, 618 volume reached in 1943 and a net profit after income taxes and other provisions was $843,607 as compared with $726,815 in 1943.

The net profit per common share, after deducting the regular quarterly preferred dividend was $2.97, an increase of 46 cents over the 1943 dividend of $2.51. A total of $240,822 was paid in dividends of which $203,194 was paid to the company's common stockholders at the rate of 75 cents per share, as compared to a 50 cent dividend last year, Mr. Angle revealed.

During 1944, the company pay roll climbed to a new high point of $11,-496,714 an increase of $1,625,467 over 1943. The back-log of unfilled orders at the end of the year stood at $22,408,-182. The report included the operation of company-owned radio stations, WHAM-WHFM, Rochester, N. Y. and the firm's subsidiary in Toronto, Canada.

Mr. Angle told the stockholders' meeting that 95% of the firm's 1944 production was for the armed forces, with the remaining 5% devoted to the production of high priority civilian communications necessities; radio and radar equipment, receivers, transmitters, and specialized devices for ships, planes, and ground use—made up the largest portion of the company's manufacture, with telephone, switchboard and sound equipment for use in hospitals, training camps, on battleships, aircraft carriers, landing craft and hospital ships, high on the list of secondary products.

Sylvania Electric To Open New Plant

Expansion of manufacturing facilities for the production of electronic products will include a new plant at Marietta, Ohio, according to a recent announcement by Sylvania Electric Products, Inc. The new 22,000 sq. ft. plant will be located in a five story brick building recently leased from the Marietta Chair Co. W. H. Lamb will serve as plant manager and Edward Lewis will be resident general manager. Production is scheduled to begin at an early date.

The present organization is an outgrowth of the Hygrade Lamp Company in Massachusetts and the Sylvania Products Company in Pennsylvania. Merger of these two concerns in 1931 created the largest independent producer of radio tubes and electric lamps in the world.

Herbert W. Forster Passes

Herbert W. Forster, 47, advertising manager of Western Electric Company, died March 30 at the Roosevelt Hospital following an acute heart attack. He was a resident of Rockville Centre, Long Island.

Mr. Forster began his Bell System career in the personnel department of Western Electric in 1924. He shortly became the editor of two of the company's newspapers and served as associate editor of the *Western Electric News*.

In 1930, Mr. Forster became the company's press representative, and later as information manager conducted its information service both to the public and to employees within the business. Articles by him have appeared in the popular, trade and technical press in this country and throughout the world.

Again—No Telephone!

In the February issue of TELEPHONE ENGINEER & MANAGEMENT, we reported no local telephone service as an uncomfortable result of the war for residents of Mountain View, Arkansas, when Glen Hinkle, owner and operator of the exchange, was inducted into the armed forces; and now another Independent exchange in Kentucky is confronted with the same problem.

Service by the Wickliffe Telephone Co. of Wickliffe, Ky., was to be discontinued April 4 after 7:30 A. M., when owner Roscoe Patterson left for army induction. Patterson's draft board refused to reopen his case after he asked for deferment to operate the exchange, he said, and he has been unable to find a buyer for the privately owned company.

Serving approximately 190 telephones in and around Wickliffe, with six tributary hamlets —Barlow, Blandville, Cunningham, Burkley, Bardwell and Columbus—the exchange is also connected with the Southern Bell Telephone and Telegraph Company as a long distance switch.

Patterson and his wife have been operating the exchange for some time.

You can't beat the *Nicopress* method of making Dead-ends

1. They are designed for use on copper, Copperweld and iron wire.
2. Simplicity and speed of installation.
3. Strength and tightness.
4. Provide for a tail of any desired length.
5. No extra tools are required to make the offset dead-end as the same tool used in making regular line splices will do the job. These convenient Nicopress tools are small and compact and are extremely easy to operate close to the insulators or cross arms.

THE NATIONAL TELEPHONE SUPPLY COMPANY

The National Telephone Supply Company

5100 SUPERIOR AVENUE • CLEVELAND 3, OHIO

Canadian Mfr.— N. SLATER CO., LTD., HAMILTON, ONT., CANADA

Export Distributor—INTERNATIONAL STANDARD ELECTRIC CORP., NEW YORK, N. Y.

Keep Your Bells Ringing with SUB-CYCLE

On the Job

You'll do it too because Sub-cycle is noted for its dependable service in producing a powerful ringing current—delivering years of trouble-free service. Sub-cycle has won the distinction of being the . . . .

CHOICE of the Telephone Industry

. . . and the Telephone Industry demands efficiency under the severest operating conditions. Sub-Cycle is successfully used by Railroads — Power Companies — Private Industry — Fire Alarm Systems — Telegraph Companies—Pipe Line Systems.

• **ALSO PULSATORS** •

Sold by Leading Distributors

LORAIN PRODUCTS CORPORATION
LORAIN, OHIO

LIGHT UP

FASTER, BRIGHTER with STRONGER

SYLVANIA

TUNGSTEN TELEPHONES SWITCHBOARD LAMPS

- *LIGHT UP QUICKER*
- *MAXIMUM END-ON CANDLE POWER*
- *MAINTAIN HIGHEST BRILLIANCY*
- *POSITIVE DAYLIGHT SIGNALS*
- *NEVER DAZZLE*
- *QUICKER RELAY OPERATION*
- *AVERAGE LAB LIFE 1500 HOURS*

Write for Free Specification Chart

BUCKEYE TELEPHONE and SUPPLY CO.
COLUMBUS 6, OHIO

DRIERITE

The Modern DESICCANT FOR DRYING CABLE SPLICES

DRIERITE dries the Cable Splice by positive absorption of all moisture from wires, insulation, bandage and surfaces inside the sleeve. Application is easy and rapid.

The snow-white granular ***DESICCANT*** is neither poisonous, corrosive nor abrasive, and does not evolve gas, fume or odor either in storage or in use. It eliminates all chance of fire, accident or discomfort to workmen or occupants of buildings.

STANDARD PACKAGES

1/8 Pint Can (50 grams), 48 per Carton.
1/2 Pint Can (200 grams), 12 per Carton.
1 Quart Can (800 grams), 12 per Carton.

For Sale by the Manufacturer and leading telephone supply houses.

W. A. HAMMOND DRIERITE CO.
XENIA, OHIO

The "PHONE EASE"

holds the telephone in proper position—freeing both hands for use—

NOW it is easy to write orders, light your smokes, hold your books, thumb thru files, doodle or do any number of things without interrupting telephone conversation. Simply snap this handy servant to your receiver and it is ready for use. Nothing to get out of fix—works equally well on either right or left shoulder. Order yours today . . . $1.50 each.

Send orders with remittance to

TELEPHONE ENGINEER Book Corp.
7720 Sheridan Road Chicago 26, Illinois

New Staff Engineer At Stromberg-Carlson

Theron L. Bowser is the new telephone staff engineer of the Stromberg-Carlson Company, according to an announcement by Frederick C. Young, vice-president in charge of engineering and research. Mr. Bowser will work under Dr. H. R. Reed, chief telephone engineer for the fifty-one year old radio and telephone company.

Theron Bowser is to provide up-to-date information on trends within the telephone industry and study new types of equipment which might become part of the company's standard telephone line. He will also help set up performance characteristics to be used as criteria in telephone design.

Theron L. Bowser

A graduate of Massachusetts Institute of Technology with a Master's degree, Mr. Bowser was one of eight students chosen in 1926 for the first Bell System—M. I. T. experimental venture in cooperative education and telephone engineering. The five-year curriculum involved field study and work at Western Electric, New York Telephone Company and the Bell laboratories. From 1929 to 1937 Mr. Bowser worked in the New York Telephone Company's engineering department. He was associated with the Public Service Corporation of New Jersey from 1937 until 1939, and from 1939 until 1941 he worked with the Leich Electric Company. He joined the Stromberg-Carlson Company in 1941, first in the research department and then as assistant engineer in charge of the telephone development laboratory.

Purchase Oregon Exchange

Frank E. Burr and Opal M. Burr have purchased the Myrtle Creek Telephone Company from H. W. Cornutt.

Synthetic Rubber Production

Production of special synthetic rubber latex now exceeds one and one-half million pounds per month at one of the government's latex producing plants, operated for Rubber Reserve Company by United States Rubber Company at Naugatuck, Conn., according to J. P. Coe, general manager of the company's synthetic rubber division.

This liquid form of synthetic rubber replaces natural rubber latex where it was used in the manufacture of most synthetic rubber tires, and in fabric and paper impregnation.

"Nearly ten million pounds were produced last year, at the Naugatuck plant and production by the end of this year is expected to reach two million pounds per month, dry weight, of synthetic rubber latex," Mr. Coe stated.

"This production compares with a natural rubber latex of six million pounds per month just before the war."

Increased Rates

The Taisley Telephone Company, Donnelly, Minn. increased its monthly rates from $1.00 to $1.25 as of April 1 by authority of the Minnesota Railroad and Warehouse Commission.

IMPROVE PARTY LINES

ELIMINATE NOISE
with the
Improved RTC-2 VINCENT
RARE GAS RELAY
for harmonic or coded bells

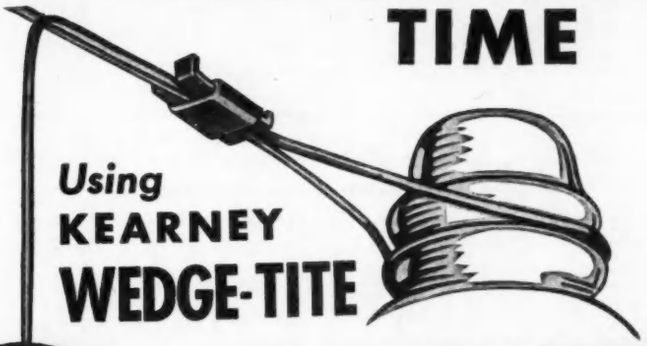
Dual purpose device which economically improves both ringing and transmission on party lines.

NO MOVING PARTS.
Fully Guaranteed.
Can be installed in a minute

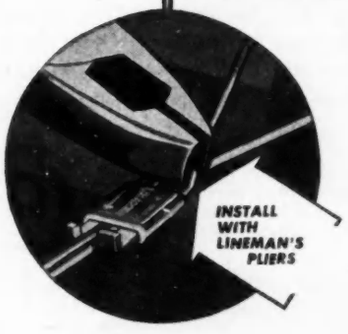
Write for Catalog 39-A describing
Non-Grounding Rare Gas Arresters
Terminal Strips • Potheads • Housings

L. S. BRACH Mfg. Corp.
55-63 Dickerson St. Newark, N. J.
Signal Circuit Engineers Since 1906

SAVE INSTALLATION TIME



Using KEARNEY WEDGE-TITE DEAD-END CLAMPS



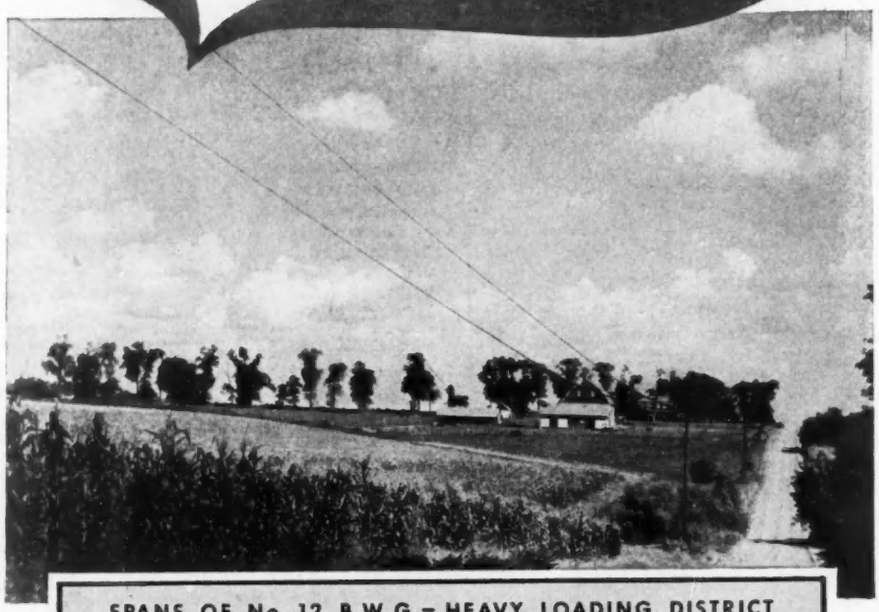
This Kearney dead-end clamp develops the full strength of copper or copperweld wire. It is installed with ordinary pliers and can be removed for salvage of the wire or clamp. Slack can be taken up or paid out at any time.

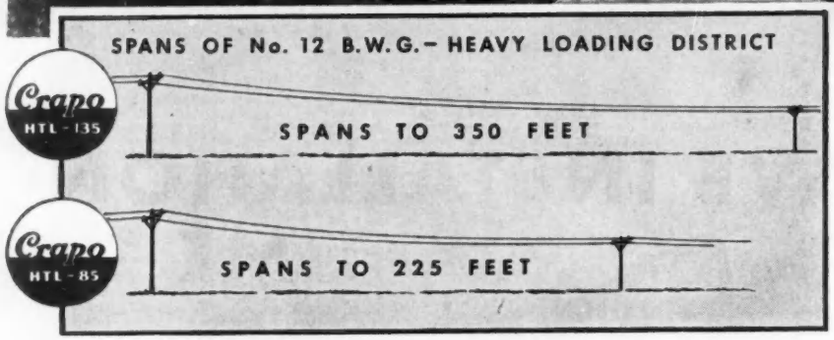
JAMES R. KEARNEY CORPORATION ST. LOUIS, MO.

DISTRIBUTED THROUGH JOBBERS

TELEPHONE ACCESSORIES

Meet Post-War Demands With Longer Spans





LONG-SPAN construction, made practicable by *Crapo* High-Tensile Line Wire, will enable telephone companies everywhere to meet economically—and profitably—tomorrow's increased demands for rural service.

Longer spans mean fewer pole structures with a resultant initial saving in material and labor. Maintenance costs too, are minimized, for the superior strength of *Crapo* High-Tensile Line Wire reduces the possibility of service interruptions.

Crapo HTL-85 has 60% greater strength than standard B.B. wire; permits spans of 225 feet in heavy loading to 375 feet in light loading districts.

Crapo HTL-135 has two and one-half times the strength of B.B., makes possible extra long spans of 350 feet in heavy loading, 500 feet in light loading areas. Both *Crapo* HTL-85 and HTL-135 have telephonic transmission qualities, at voice frequency, superior to B.B. Wire.

Write for Technical Information!

Plan now to take full advantage of these economical, high-strength wires in your reconstruction program. Contact the nearest distributor of *Crapo* Galvanized Telephone Wire and Strand, or write direct for Bulletins No. 201 and No. 202!

Crapo HIGH-TENSILE LOW-RESISTANCE LINE WIRE

INDIANA STEEL & WIRE COMPANY · MUNCIE, INDIANA

Plans $200 Million Postwar Plant Construction

The 1944 report of the New York Telephone Company contemplates capital expenditures of more than $200,000,000 for a five-year postwar program which will include the expansion of both local and toll plants, the further extension of dial service, a general vehicular radio telephone service for New York and vicinity, and the development and improvement of rural lines.

Charles Schlieckert Heads New Agency

Charles Schlieckert, former advertising manager for Cook Electric Company, now heads a new advertising agency, Technographics, Inc., with offices at 1457 Diversey Parkway, Chicago.

Charles Schlieckert

The agency will specialize in industrial advertising and the marketing of new and improved industrial products. Present accounts include Cook Electric Company, Woodruff & Edwards, Metal Fusion Corporation of America, Aero Liquids Corporation, Fred W. Gehrer Co., and Kem-Stone Products Co.

In addition to Schlieckert, who is president and part owner of Technographics, Inc., executive personnel of the new agency includes Roland Fulton, vice-president; Carl E. Lundeen, secretary and treasurer; Sidney Borden, art director; and Florence Wolfe, space buyer.

New Lighting Products Booklet

A new lighting products booklet containing useful information for industrial and commercial users of lighting is available from Sylvania Electric Products, Inc., 60 Boston St., Salem, Mass., on request. The booklet contains comprehensive information about industrial, portable and inspection type of fluorescent fixtures; fluorescent lamps, and many types of incandescent lamps.

Spring Construction Planning

(Continued from page 49)

a number of drops can be effected by the use of drive hooks and drop wire clamps in place of pole brackets and porcelain insulator drop wiring supports. Fig. 10 illustrates how a number of drops may be neatly supported by a single drive hook. The more extensive use of span drop wire hooks will permit better routing of drops and greater freedom from tree interference and constant wear. The use of a span clamp to avoid tree interference is shown in Fig. 11.

Fig. 11—Use of span drop wire clamps to provide better feed.

Cable Plant Overhaul

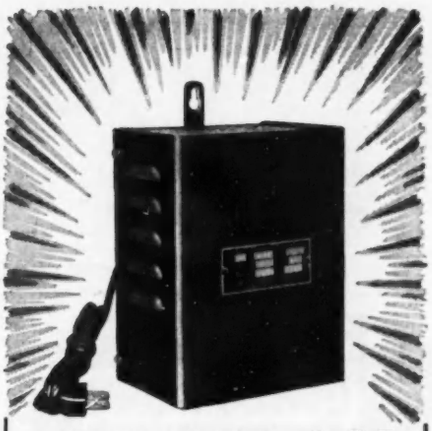
THE cable plant overhaul should concern itself first of all with the correction of any condition which might be a source of sheath trouble. This would include large loops in the cable due to missing rings, excessive bowing, tree growth, ring wear at or near poles, improperly supported sleeves, lack of grade clamps (ring suspended cable), excessive pull on the cable at corners or at terminal legs, etc. The corrective remedies for those conditions are too well known to require much explanation here.

In the case of trees sufficient growth should be removed to minimize the possibility of limbs contacting the cable between inspection periods. Where it is impossible to get property owner's approval of extensive trimming operation, the cable should be protected with split wood molding. It should be kept in mind that limbs need not necessarily bear against the cable in order to produce crystallization and ring wear as the constant vibration of a limb against the supporting strand will eventually result in trouble.

Where cable is to be subsequently replaced, it is feasible to effect temporary repairs to sheath cracks and breaks by means of several layers of friction tape wound in reverse direction over the defective sheath.

Additional Terminals a Good Investment

IF cable splicing help can be secured, there is no better time than the present to place additional terminals in each block and rearrange drop wiring so as to provide more direct feeds and shorter drop runs. A surprisingly large amount of drop wire can be recovered in this manner. If ring cutting trouble has been experienced on various sections of cable and if it has not progressed too far, it may be found desirable to remove the rings and lash the cable. If any substantial amount of cable is to be lashed, a cable spinner should be used. Small amounts can of course be lashed by hand.



ELECTROX
BATTERY
ELIMINATOR
GIVES WORRY-FREE SERVICE

Operates direct from lighting circuit. Delivers constant, humless D.C. to operator's circuit on magneto switchboard. Power-off relay assures uninterrupted service in case of power failure. Low in cost! See your jobber, or write direct for full information.

SCHAUER MACHINE COMPANY
2059 READING RD., CINCINNATI 2, OHIO

LEADING TELEPHONE COMPANIES STANDARDIZE ON

PENTA POLES

P&H PENTA

FULL-LENGTH TREATED NORTHERN WHITE CEDAR

The full length treatment protects Penta Poles from top to butt

PAGE AND HILL CO.
MINNEAPOLIS, MINNESOTA · 50 CHURCH STREET, NEW YORK, N. Y.
"STILL IN THE LEAD"
Distributed by AUTOMATIC ELECTRIC SALES CORPORATION STROMBERG-CARLSON COMPANY

The Clearing House

For the convenience of readers of Telephone Engineer

Directories

TELEPHONE DIRECTORY ADVERTISING

L. M. BERRY & CO.

Write or Telephone for Proposition

TELEPHONE L.D. 16
TELEPHONE BLDG., DAYTON, OHIO

Telephone Engineers

JAY G. MITCHELL
Consulting Engineer
Operating and Management Economics
Plant—Equipment—Revenue
P. O. Box 43
EATONTOWN, NEW JERSEY

J. G. WRAY & CO.
Telephone Engineers
Specialists in Appraisals, Rate Surveys, Financial Investigations, Organization and Operation of Telephone Companies
105 West Adams Street
CHICAGO

MANFRED K. TOEPPEN
ENGINEER
Consultation - Investigation - Reports
261 Broadway, New York 7, N. Y.

Plant Wanted

WANTED TO BUY OR LEASE
An ex service man having years of varied experience will buy or lease your exchange, or buy an interest in a good plant. I am not interested in speculating but need a business which will provide a living. Address Box 8368, c/o TELEPHONE ENGINEER.

WANTED a telephone company in Southern California. Pay cash. Write Box 8372, c/o TELEPHONE ENGINEER.

WANTED Telephone plant 120 or 200 stations. Terms desired. Any state. Write W. A. Chambers, Zavalla, Texas.

For Sale

FOR SALE: Two telephone exchanges of about 325 owned stations and 200 switched. Located in central Illinois. Plant in good condition. If not interested please do not reply. Write Box 8374, c/o ELEPHONE ENGINEER.

Poles

Cedar Poles
MAC GILLIS & GIBBS COMPANY
Wells Bldg., Milwaukee 2, Wis.
★ ★
Northern White and Western Red Cedar Poles—Plain or Butt-Treated

finishing cloths

packed in cartons

CABLE-SPLICERS WIPING CLOTHS

Wipe Perfect Joints

on lead-sheathed cable splices

catch cloths

sealed in wax paper wrappers

GEO. E. WILLIAMS, *Mfr.*

3035 Aldrich Avenue So. Minneapolis 8, Minn.

SPLICER'S TOOLS

Of Top Quality by **UNIQUE**

- FURNACES
- SOLDER POTS
- BLOW TORCHES
- WIPING CLOTHS
- BALANCED LADLES
- SOLDER IRON HANDLES
- THAWING TORCHES
- FOLDING SAFETY SHIELDS

Protect Public, Cplicer, and Furnace. No. 50 C Shield shown here. Of 2 Ga. galvanized steel. Reinforced edges. 23"x17" x17". No. 50—four-sided with grate. No. 50 A—same without grate.

Your Jobber Has These Tools

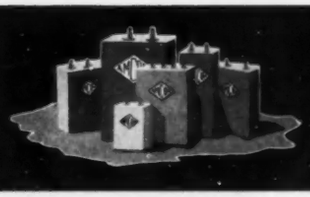
UNIQUE MANUFACTURING CO., INC.
231 W. Walton St., Chicago 10, Ill.

Reconstructed Equipment

Kellogg or Dean 100 ohm drop Coils @	$ .30
Kellogg, Dean, Stromberg or Western Elec. New Mouthpieces @	.08
Kellogg or Western Elec. New Composition Rec. Shells with caps @	.45
Sterling, Am. Elec. or Century Slip type Receiver with New Shells & Cord @	1.25
Kellogg No. 22 or Western Elec. No. 329 Transmitters with backs @	1.35
Western Elec. Individual jacks, will fit No. 47 Plugs @	.40
Western Elec. No. 22C Shutter type drops and jacks per strip of 5	10.50
Western Elec. No. 2C Ball type drops and jacks per strip of 5	8.25
Western Double wound shutter type ring off drops per strip of 5	8.25
New Compact Telephone Cabinets Not drilled or wired @	3.50
Kellogg No. 103 1-M. F. or No. 10 ½ M. F. Condensers @	.40
Western Elec. No. 1001C All metal hand set with switch hook push button in handle complete with 3 Cond. cord @	5.00
Western Elec. No. 156A Listening and double ringing Key with Trans Batt cut off contacts @	2.50
Dean or Garford peanut line and cut off relays on Mfg. plates, Units of 50 pairs on Mfg. Plate @	50.00
Used Stromberg Swbd. Plugs fits No. 11 Drop and jack practically new @	.40
Stromberg Carlson No. 19 Short transmitter Arms @	.50
Western Elec. ½ M. F. Condensers @	.35

REBUILT ELECTRIC EQUIPMENT CO.
1704 West 21st Place
Pilsen Station, Chicago 8

For DEPENDABLE, RELIABLE SERVICE
Use AMCON AMERICAN TELEPHONE and TELEGRAPH CONDENSERS
Specification sheets on request
AMERICAN CONDENSER COMPANY
4410 N. Ravenswood Avenue CHICAGO 40, ILLINOIS



Position Wanted

POSITION WANTED: Cable Splicer thoroughly experienced, construction, maintenance, trouble shooting. 10 years experience both aerial and underground. Position must be permanent, 40 years of age, married, one child. Christian. Send full details, c/o Box 8369 TELEPHONE ENGINEER.

Position open for man experienced in general inside and outside plant maintenance and on common battery and North Automatic equipment. Permanent position and top salary. Pecos and Northwestern Telephone Co., Pecos, Texas.

POSITION WANTED

An ex service man who voluntarily left a good executive position three years ago to serve with the Signal Corps, wants to re-enter the business he "grew up in". I came up the "hard way" and am still a young man. Do you have a position for me or would you sell an interest? I'm available now and won't be idle long. Address Box 8367, c/o TELEPHONE ENGINEER.

COMMON BATTERY
Wooden Wall Telephones

NO RATING REQUIRED

KELLOGG
F-729 TYPE
GOLDEN OAK CABINETS
STRAIGHT LINE OR HARMONIC RINGERS
COMPLETE AND TESTED
READY FOR SERVICE
Also in stock—Kellogg 97 and 118 Desk Stands—408 and 407 Wooden Boxes.
BUCKEYE TELEPHONE & SUPPLY COMPANY
COLUMBUS 6, OHIO

Help Wanted

WANTED: Trouble man capable of handling Common battery, Western Electric, Automatic and Magneto telephones and switchboard, clearing trouble and installing telephones. Write: C. J. York, Crawford Telephone & Telegraph Co., Girard, Kansas.

WANTED: Man experienced in magneto and common battery telephone work for three exchanges having 1,500 telephones. Must be a good switchboard man and have some knowledge of commercial and traffic work. COMMUNITY TELEPHONE COMPANY OF WISCONSIN, Black River Falls, Wisconsin.

WANTED: By Telephone Co. in Middle West experienced repair man and lineman. Good salary for men who can qualify. Furnish full details of experience, draft status, etc. Statement of availability required. Write Box 8364, c/o TELEPHONE ENGINEER.

WANTED: Telephone Accountant—qualified to supervise all phases of telephone accounting for Class A companies. Give full information as to age, experience, draft status, etc. Attach small photograph. Telephone Services Inc., 16th Floor Lincoln Tower, Fort Wayne, Indiana.

WANTED: Combination Plant Man to take care of Automatic Electric Dial exchange of 625 stations. Opportunity for permanent employment and good wages. Give age, experience, draft status and availability. Write Oklahoma Telephone Company, Broken Arrow, Oklahoma.

WANTED: Telephone men for our Chicago factory. Steady work now and after the war, good wages and working conditions. To rebuild: telephones, magneto switchboards and dial switchboards. Telephone Repair & Supply Co., 1760 Lunt Ave., Chicago, Tel. ROGers Pk. 3818.

New York State Telephone Bills Lost

The bill sponsored by the New York Telephone Association, providing that telephone instruments, station installations, exchange switchboards, drop wires or other similar personal property owned by a telephone company or corporation on subscribers' premises shall be defined as personal property and not as real estate for tax purposes, was recommitted by the Judiciary Committee and killed.

Don Walker, executive secretary of the New York Association, also reports that the Stokes-Milmoe Bill sponsored by the New York Telephone Association to grant a $15,000 specific exemption from the 2% gross income of utilities, passed the N. Y. State Senate on the last day of the legislative session, but was allowed to die in the Rules Committee of the Assembly. The bill was to provide tax relief to many of the small Independent telephone companies that cover about half of the upstate New York area.

PLANT ENGINEERING and CONSTRUCTION
Anywhere In The World
•
Building and Rebuilding Telephone Plants
•
Wiring Jobs, Installations, Switchboard Alterations
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Expert Consultants On All Telephone Problems
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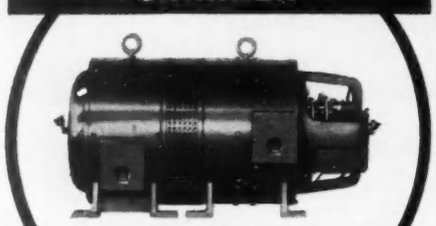
ASSOCIATED TELEPHONE ENGINEERS, INC.
(New Name of National Construction & Engineering Company—Enlarged Personnel and Organization)
1031 West Van Buren Street
Chicago 7, Illinois

The E. P. DIVERTER POLE CHARGER



Is Preferred Equipment for Floating Charge of

TELEPHONE EXCHANGE BATTERIES

Because:---

- Of the inherent characteristics it delivers safe, satisfactory service at minimum operating and maintenance cost, prolonging battery life and conserving electrical energy.
- It is completely automatic in operation, eliminating all need of manual attention to the charging for continuous service.
- It controls the exchange voltage well within high-low limits at all times. It provides this by the compounding action of the magnetic bridges and the effect of the Diverter Pole Field.
- It provides a closely controlled charging rate, enough to compensate for losses and maintain the battery in a healthy fully charged condition.
- It is thoroughly dependable, specially designed, carefully constructed, adjusted to precision limits and thoroughly tested.

It is built to safety first standards and has the endorsement of the battery manufacturers.

For complete details write for Bulletin No. 96A

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1729 CLARKSTONE ROAD · CLEVELAND 12, OHIO

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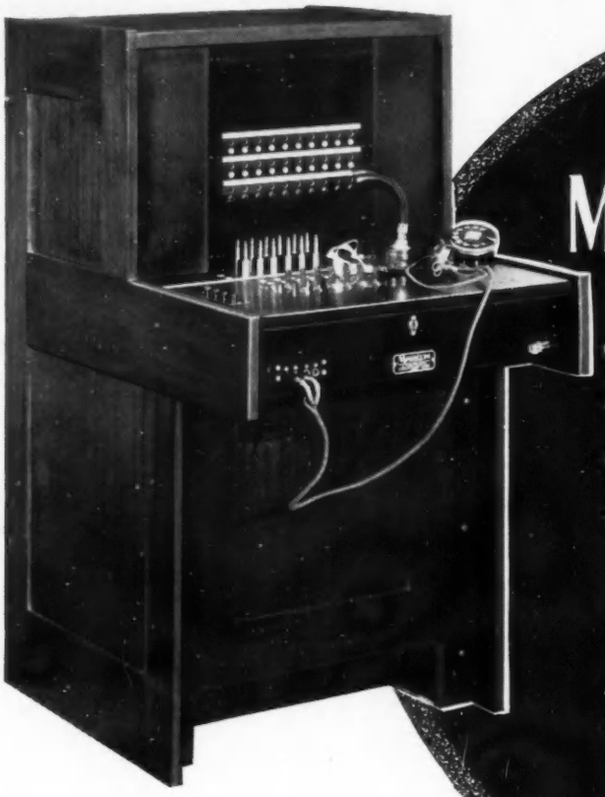

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- ✓ IMPROVED SUPERVISION
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Sturdy Construction—Combines every modern feature to insure reliability and save maintenance, including rigid steel frame to support equipment and cabinet, easily accessible cord circuit and line equipment, and simple, clean-cut key shelf.

The complete story on the Type 44 P-B-X is given in Circular 1666. Write for a copy today.

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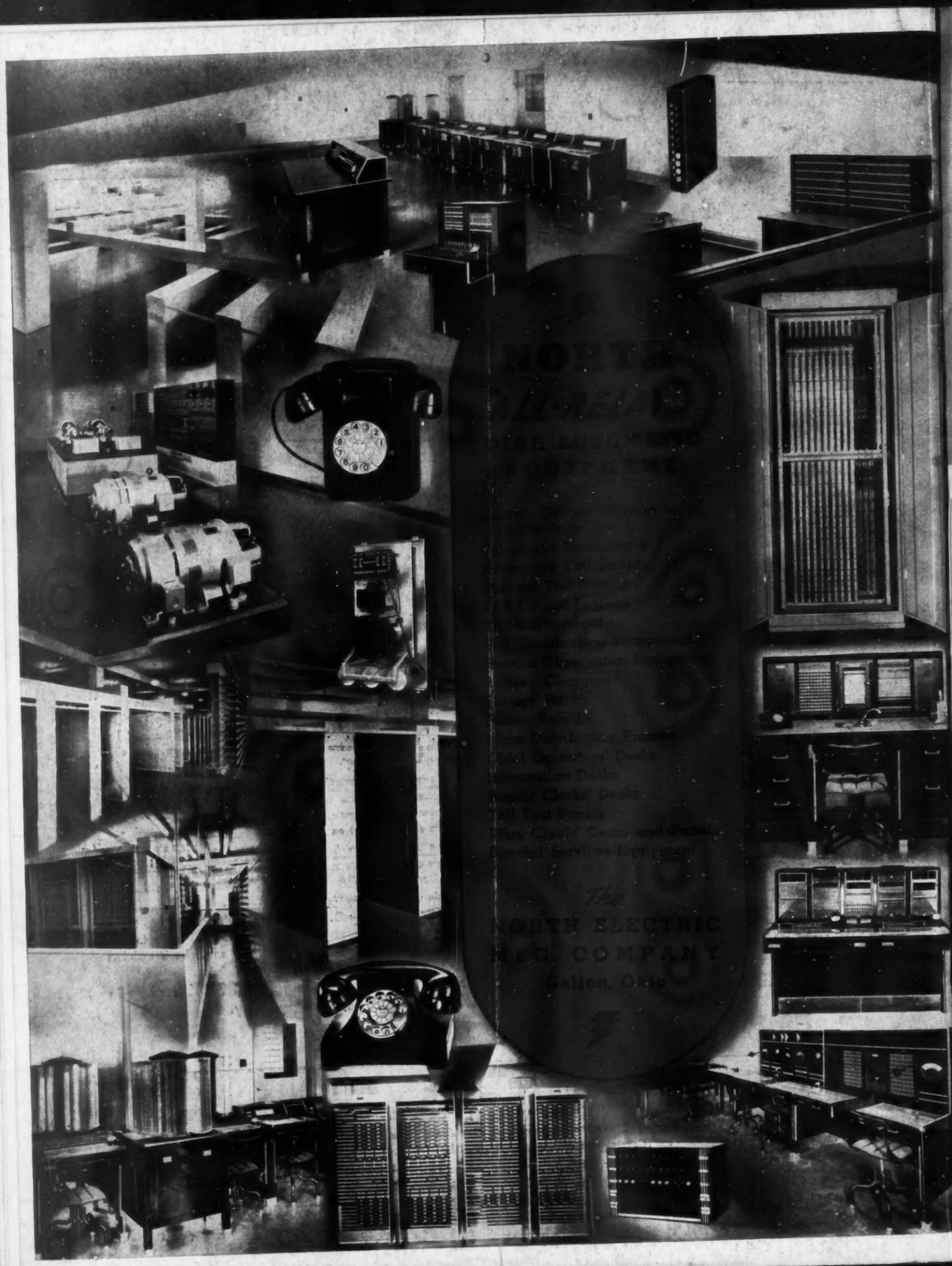
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